

STANDARDIZATION NETWORKING THE FUTURE

ANNUAL REPORT 2015



DKE
VDE DIN



Photo: Roland Bent, Phoenix Contact

Roland Bent
President of the DKE

Dear Reader,

“To promote accident prevention in the interests of public safety and consumer protection, in particular to protect the users of electrical engineering, electronics, information technology and computer science products, to protect the public from physical danger, and to protect property, the environment and other values“: that is how it is phrased in the VDE statutes. This primary objective of ensuring that people remain safe when dealing with electricity is largely achieved by means of electrotechnical standardization. This guiding principle has given rise to a comprehensive set of standards over the last 120 years. VDE 0100, which details the safe construction of low-voltage installations, was the original VDE standard, yet the subsequent decades saw the development of specific standards for a wide range of electrotechnical applications.

Rapid technological progress, especially in the last 20 years, has confronted us with many technologies and application complexes such as the Smart Grid, Industry 4.0 or electric mobility which are highly systemic in nature. Convergent, cross-cutting technological issues such as information security run consistently through all applications. Right from the outset, standards have constituted an important basic framework and provide guidance in these complex topics. They link together the individual areas to create the great technical themes of today. Jointly established standards require cross-disciplinary cooperation and bring together players from such diverse areas as medicine, engineering, sociology and business, for example, to create a working group in the field of Active Assisted Living. The same applies to Industry 4.0, where the machinery and plant producers are working hand in hand with automation technicians and IT specialists. Consensus-based standards and specifications are essential prerequisites for the successful implementation of new concepts and technologies in such cross-cutting issues. But technological change is not the only factor here. The standardization policy framework is also changing. There are increasing calls for freely available standards, more transparency and shorter turnaround times. An efficient, continuously optimized system for electrotechnical standardization represents a key element in securing the future of Germany as a business location. Methods for achieving this now need to be found.

Standardization roadmaps represent one solution. DKE technical experts are releasing increasing numbers of these publications on the key application complexes, with the goal of making the jointly generated results available to interested groups and policy makers. Such publications pick up on the latest developments, foster a common understanding and help raise awareness in related areas. In doing so they pave the way for integrated solutions, highlight the need for standards and specifications and serve as a strategic model for European and international standardization work. The DKE is rising to face the challenge of technological development by adopting this cross-disciplinary approach. But the future holds further challenges which also need to be overcome. Possible solutions could lie in the targeted use of modern IT tools or in the optimization of processes or organizational structures. Topics such as content management, online communication and standards management are discussed and addressed in the DKE's own internal "Standardization 2020" programme which focuses primarily on the strategic orientation and ongoing development of the DKE's services for standards users and technical experts.

We are considering new forms of cooperation and new methods of online standard processing and commenting. We are installing tools like the Use Case Management Repository as the basis of new approaches for standardization. We are using new communication channels such as social media and webinars for the dissemination of standards-related and other information.

With safety as our goal, and as guardians of the knowledge about tomorrow's technologies, we are committed to STANDARDIZATION NETWORKING THE FUTURE



Roland Bent, President of the DKE

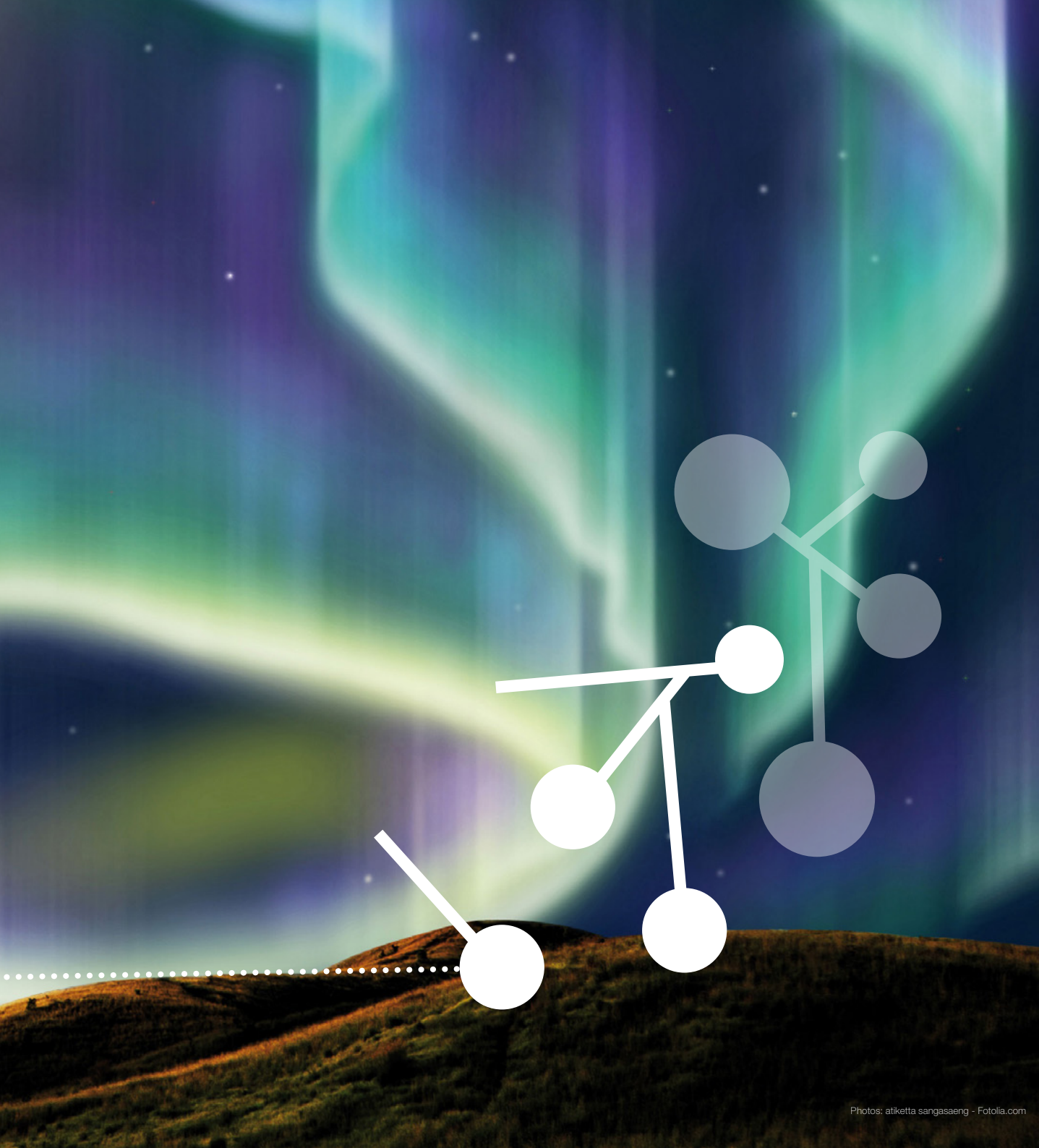
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ENERGY

AURORA BOREALIS – THE OTHER SOLAR ENERGY

Auroras are natural phenomena that can be observed at the Earth's magnetic poles. Electrically charged particles emitted by solar flares collide at great speed with particles in the Earth's atmosphere at the poles. Various interactions then excite these particles. Much like an oversized LED, the absorbed energy is released as light pulses and the sky appears to glow in different colours.



Alongside the aurora phenomenon, lightning is a further example of a natural, uncontrolled electrical discharge. Even those working in the most advanced technological fields have so far not come up with a viable method for harnessing the enormous amounts of energy released by lightning bolts for the benefit of humanity. On the other hand modern technical equipment in the form of modern lightning protection has largely tamed the capacity of this elemental force to do harm. Yet this has not come about by accident. Safety is the result of clear rules and unambiguous definitions. Especially when these are arrived at democratically and by the consensus of all stakeholders. The DKE brings together the knowledge of all the expert bodies, while providing efficient structures and services. For technically up-to-date, market-oriented and universally recognized rules.



“They are smaller, lighter and more efficient, and so the number of switch mode power supplies being used is rising ever faster. As described in European Standard EN 50160, the voltage quality of public power networks should be preserved even when the ambient conditions change as a result of this. This would help ensure continuing reliability in the power supply.”

Klaus-Peter Bretz

Standardization Manager Communications,
Telecommunications and Information Technology



**THE GERMAN STANDARDIZATION
ROADMAP ELECTRICAL ENERGY
EFFICIENCY**

Interest levels were high: the DKE began work on the *German Standardization Roadmap on Electrical Energy Efficiency* in the autumn of 2015 together with various electrical engineering stakeholders.

Energy efficiency is a key aspect of the energy revolution. It is the cleanest, most economical and safest ‚resource‘ - and it can be accessed immediately. Energy efficiency affects many areas and has therefore become a cross-cutting issue. Because the highly efficient use of energy is essential at all levels - from production, transport and storage through to consumption.

And this is where the work of the DKE comes in: a central document is to be created in close cooperation with all stakeholders, experts and interested parties which brings together all existing knowledge and describes the current state of the art. The Standardization Roadmap includes recommendations for action, identifies areas in which standardization is required and provides a time frame for the processing of open points.

„In addition to the work in the relevant DKE working group we are also using various social media channels (XING, LinkedIn, Twitter) to reach all those who are interested in the subject but are not yet involved in electrotechnical standardization,“ explain project managers Henriette Boos and Frank Steinmüller.



ENERGY



Publication of the Standardization Roadmap in German and English is planned to coincide with the 80th IEC General Meeting in 2016 in Frankfurt.

INTERNATIONALLY STANDARDIZED POWER INSTALLATIONS

Transmission and distribution of AC voltages of 1 kV or more or DC voltages (DC) exceeding 1.5 kV are crucial in ensuring a reliable supply of electric power. Together with other equipment required e.g. for generating, transforming, storing or consuming electrical energy, these are referred to as power installations. Standards are being developed for

the design, construction and earthing of power installations in AC and DC networks. The aim of the standardization is to ensure reliable and proper functioning during normal operation.

This includes, for example, switching and substation facilities for public supply networks, including the supply of electricity to railway systems. The scope also includes electrical networks of industrial plants and electrical equipment on offshore platforms for wind farms.

The main standards have now become internationally agreed documents as a result of European harmonization efforts and subsequent consolidation at IEC level. The general requirements for power installations have been revised and, with the exception of a few national differences, the normative provisions now apply uniformly and without exception throughout Europe.

The latest guidelines for users of the standard can be found in the recently published new edition of Volume 11 of the VDE series entitled „Power installations with nominal voltages above 1 kV“.

This is principally of relevance for high voltage DC systems and systems for offshore platforms.

Supplementary requirements are being drawn up at the international level for high-voltage DC systems, whereas the subject of earthing - including on offshore platforms - is a European standardization issue.

DKE committee experts are represented in all these areas, thus ensuring that the experience of German professionals is reflected in the eventual documents.





Photo: Markus Mainka - Fotolia.com

NEW OVERHEAD LINE REQUIREMENTS

The transmission capacity of existing overhead lines can be increased by using different cabling (replacement), allowing the weather to determine the use of overhead lines (operational management), or converting the circuits from AC to DC. While the first two options have already been described in standards or VDE application guides, there is need for standardization for the third option; this is to be met in the form of a VDE application guide. It could involve e.g. converting an existing circuit from AC to DC transmission on an existing pylon (AC/DC overhead line) or constructing a parallel DC overhead line in close proximity to an AC power line.

Both require additions to, or the modification of, the existing design criteria of the AC overhead power line standard. Work is therefore currently being carried out on a VDE application guide to specify the electrical requirements (insulation

coordination, distances, earthing, etc.) for overhead line insulators and fittings for AC/DC or DC power lines. These will apply to the planning and construction of high-voltage overhead power lines with AC/DC systems as well as with DC systems with a rated voltage of over 45 kV. They will, however, be independent of the converter technology.



STANDARDIZATION ROADMAP „DIRECT CURRENT IN LOW VOLTAGE SYSTEMS“

New and innovative applications in the field of energy supply and electromobility always require new solutions for the use of direct current systems. This also applies for building installations in which, for example, a DC power infrastructure could be installed in addition to the AC mains as a means of avoiding losses in individual parts of the network. These considerations were the starting point for initiating a standardization roadmap on „DC in low voltage systems“ that is being developed by an expert group in the DKE with the participation of all interested parties.

Protection targets and concepts will feature prominently in the roadmap in addition to a general section on standardization. Basic safety and operation elements are being examined in detail. The economic and legal framework, including a consideration of potential markets, will be included as well as an examination of DC topologies and architectures. The different voltage levels, producers and energy storage facilities are also discussed.

A number of use cases and descriptions of project and research activities complete the content of the Standardization Roadmap. The resulting recommendations for action and the need for standardization will be particularly ground-breaking in terms of the standardization activities. Conceived as a reference section, the annex contains a list of all relevant standards, including brief descriptions of them.

While work was being carried out on the Standardization Roadmap, the IEC and the Bureau of Indian Standards (BIS) held a successful international workshop in New Delhi on the subject of „LVDC - Redefining Electricity“ at the end of October 2015 which attracted more than 200 participants. The aim was to discuss and advance standardization in this field.

Publication of a first edition of the Standardization Roadmap is planned for the first quarter 2016 and - like all DKE standardization roadmaps - will be available free of charge to the public.

VDE APPLICATION GUIDE FOR STATIONARY STORAGE UNITS

Many homeowners generate electricity with their photovoltaic system and feed it into the public grid. Anyone wishing to be energy self-sufficient and consume the power themselves is faced with the same challenges that apply to all volatile forms of energy: the electrical energy needs to be stored.

The variety of home storage systems available on the market has increased accordingly. Furthermore, falling prices have raised the number of KfW grant

applications. According to the German Solar Industry Federation (BSW-Solar), there are currently approximately 25,000 solar power storage units in use. This led to an increase in public interest in lithium ion-based batteries in the last year. In standardization circles it was acknowledged that there is an urgent need to define rules for connection conditions and for the testing of cells, batteries and storage units. At the national level, VDE application guides were therefore developed with the aim of increasing the safety of the storage systems. The VDE „Stationary electrical energy storage systems intended for connection to the low-voltage grid“ includes the safety requirements for the planning, construction, operation, disassembly and disposal of these energy storage systems for fixed connection to local electrical installations connected to the low-voltage network. It takes into account various hazards that can arise from switching between different parallel or isolated network operating modes.

This VDE application guide also includes complete energy storage systems and is aimed above all at installers. It was published in September 2015.


The second VDE application guide „Stationary energy storage systems with lithium batteries - safety requirements“ Application Guide only applies for battery energy storage systems (BESS) with batteries consisting of lithium-ion cells or other lithium-based cell chemistry such as lithium-polymer cells.

It focuses primarily on safety requirements for batteries and battery components of energy storage systems as well as related testing and acceptance conditions for lithium batteries. It contains requirements designed to ensure the safety of the storage units throughout their life cycle - warehousing, transport, installation, operation, repairs, disassembly and recycling.

The scope is confined to residential and small-scale commercial use. The aim is to increase safety levels for users of storage units. This document is at the draft stage and is currently undergoing intensive revision. Both issues will be incorporated into international IEC standardization on the basis of these VDE application guides.

GOODBYE TO CABLES

Wireless power transmission - but with acceptable EMC levels



Large numbers of cable connections in the home is a universal problem, and one which surely everyone would welcome a solution to. There are now many different projects aimed at doing away with electrical cables by transmitting the electrical energy wirelessly to devices. Some mobile phones, household appliances such as shavers or electric toothbrushes, but also larger applications such as electric vehicles, buses or trams are already making use of the new technology in which the power is transmitted with the aid of electromagnetic fields.

There are further applications in the pipeline, including some for industry, where wireless power transmission will be used to supply energy to equipment and facilities. Wireless power transmission will result in a few cables disappearing from the home, but it opens up a whole realm of

possibilities for electric vehicles: There are now scenarios in which vehicle batteries can be charged while waiting at traffic lights, for example. Highly futuristic models will charge the battery while on the move with the aid of short but powerful electromagnetic pulses. This raises the hope of increasing the currently limited range of electric vehicles, without drivers having to seek out a charging station to charge up the battery in a time-consuming process.

How does wireless power transmission work?

All wireless energy transmission methods involve sending energy from a transmitter, such as a charging station, via electromagnetic fields and collecting it in a receiver fitted to the device or vehicle. The charging process can be inductive or capacitive: the former involves inducing a current in a receiver coil by means of an alternating magnetic field. The current is then rectified and fed to the device as a supply current. The energy transfer normally takes place over short distances, i.e. in the near field and can reach comparatively high efficiency levels of up to 90%. In capacitive charging, on the other hand, an electric field is created between two metal plates which act as two halves of a capacitor and transfer energy across the gap between two plates. Transmission across longer distances using electromagnetic waves or light waves is also possible. Depending on the purpose, the wireless power transmission can also be complemented by wireless communication. This ranges from a simple transmission of control signals through to more extensive information such as consumption and billing data.

Effective wireless power transmission is dependent upon a number of technical and organizational preconditions (system interoperability, electrical safety etc.)

which also includes ensuring electromagnetic compatibility (EMC). It should be noted that the electromagnetic frequency spectrum deployed for such practical applications is also used for the operation of broadcast and radio services, which must not be interfered with. This requires defining appropriate radiation limits for the relevant measurement and detection methods.

The international standard CISPR 11, which includes limits on radio equipment electromagnetic emissions, is used here as a guideline for EMC standardization. The limits were also cited e.g. in the standard on general requirements for electric vehicle charging stations. The relevant international subcommittee is in the process of drawing up specific provisions for the reduction of emissions in wireless energy transmission installations which will be implemented in a future edition of CISPR 11. The EMC standards for wireless energy transmission equipment can also be used to support regulatory requirements for these facilities and systems.

REVERSE OPERATION IN FUEL CELLS

Producing hydrogen from electricity, storing it and then turning it back into electricity and heat in a fuel cell?

The steady increase in the supply of fluctuating renewable electricity raises the essential question of how best to secure the supply of energy to industry. At present, reliable heat-controlled processes constitute the basis of industrial production, whereas fluctuating electrical process management will be called for in the future. Fuel cells, as continuous electrochemical processes, provide the basis for developing both new electricity storage technologies (power to power, power to gas) and production processes (power to substance) and for deploying them industrially.

These methods deliver electrical energy from energy-rich substances or they produce energy-rich substances as products from electrical energy and raw materials. This perspective has led to new developments worldwide, the marketing of which is to be promoted through development-related standardization.

The „Reverse Fuel Cells“ working group within IEC/TC 105 „Fuel Cell Technologies“ has developed a work programme that will be implemented over the coming years. The change in the process management makes it possible to use fuels to help guard against longer supply downtimes, such as calm periods, by increasing existing industrial energy storage capacity.

INDUSTRY

THE 7TH SENSE OF ANTS

Ants feature prominently in any consideration of swarm intelligence. Their success is characterized above all by their high degree of networking and extreme cooperation. Researchers have found that certain species of ant apparently possess electroreceptors, i.e. sensory organs which allow them to perceive electric fields. Charge flows exert such an attraction on these creatures that they even forget about foraging for food.





In their little world, ants have adjusted optimally to circumstances through a process of continuous adaptation, and have achieved maximum efficiency through sensible organization and division of labour. Industry is confronted daily with new challenges: it must adapt its processes, optimize and innovate if it wants to remain competitive. An important prerequisite for this is standardization. Mandatory reviews of the safety and environmental performance of products can be carried out on the basis of generally accepted rules of technology. A lack of confidence in products, services and new technologies would render the rapid introduction of innovations unthinkable.

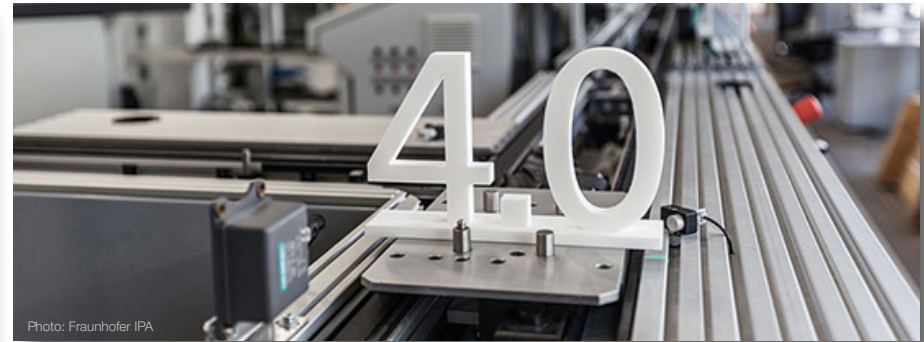


“Standardization and consensus-based standards make a significant contribution to the success of industry 4.0. It is important to incorporate consortium standards, to promote responsive standardization, to intensify international networking and to participate actively in development-related standardization.”

Reinhold Pichler

Head of DKE Competence Centre Industry 4.0

NEW STANDARDIZATION ROADMAP INDUSTRY 4.0 PUBLISHED



The DIN/DKE „Standardization Industry 4.0“ steering committee was set up in February 2014 to coordinate national standardization activities in this field and to coordinate their integration in international standardization. Several working groups are working intensively on key aspects such as industrial wireless technologies or standardization processes. The Standardization Roadmap Industry 4.0 is the main communication medium of the steering committee for interacting with standardization bodies, industry associations, research institutions and government departments. The Standardization Roadmap Working Group is responsible for the further development of the strategic, technically oriented roadmap and for revising it to reflect rapid ongoing developments. The second edition of the Standardization Roadmap Industry 4.0 was published in October 2015. Some recommendations made in the first edition are already being implemented, whereas others have already been, or are now in a position to be, specified in greater detail. Current topics such as „People in Industry 4.0“ or the Reference Architecture Model Industry 4.0 (RAMI 4.0), as well as results of the „AUTONOMICS for Industry 4.0“ technology programme projects have been included in the new version.

INDUSTRIE

PEOPLE AND INDUSTRY 4.0

People will continue to be an irreplaceable factor in the Industry 4.0 world of work in the future. Socio-technical labour systems in the form of flexible and adaptable production systems offer numerous opportunities for making work better and more people-friendly.

A fundamental aspect here is the requirement of feasibility, i.e. the physical and mental capacity of the people involved should be taken into account in the design of work systems. They must be able to carry out the work assigned to them. Furthermore, it should be ensured that tasks can be performed without any risk to the people doing them. Accidents and health problems should be avoided through optimized organization.

Further criteria include ensuring that the work is reasonable and does not cause stress. This means that, ideally, an optimum workload can be achieved: physical and mental stress due to excessive or insufficient workloads is avoided. New technologies offer also a wide range of possibilities for organizing work in ways which promote learning and personal development. Adaptive systems can help individual employees, support learning processes and

compensate for physical limitations. Work systems that offer these options can have a positive impact on health and develop employees' skills. If successfully implemented, this can improve job satisfaction, motivation and performance.

AUTONOMICS FOR INDUSTRY 4.0

The „AUTONOMICS for Industry 4.0“ technology programme was initiated by the Federal Ministry for Economic Affairs and Energy (BMWi) for the purpose of integrating modern information and communication technologies into industrial production. Its aim is to exploit innovation potential and accelerate the development of innovative products and services.

The subject of standardization was implemented as a cross-cutting topic within the accompanying research for the AUTONOMICS for Industry 4.0 programme.

The topics of standards and standardization are to be introduced and developed by the DKE as part of the services accompanying the programme in order to ensure rapid implementation in industrial practice.

JU-RAMI 4.0 AS THE BASIS OF NEW TECHNOLOGY LEGISLATION FOR INDUSTRY 4.0

The experts working on the research accompanying the technology programme have produced the first version of a „legal“ reference model for Industry 4.0 - based on the Reference Architecture Model Industry 4.0 (RAMI 4.0) - to minimize the legal risks of digital production. The purpose of „Ju RAMI 4.0“ is to allow laypeople to assess specific areas of legal risk, injury and hazard throughout the integrated value creation process.

Ju RAMI 4.0 was drawn up under the supervision of Prof. Dr. Dr. Eric Hilgendorf („RobotRecht“ Research Centre of the University of Würzburg) and Reinhold Pichler (DKE) in cooperation with experts from the projects of the „AUTONOMICS for Industry 4.0“ technology programme and experts carrying out the accompanying AUTONOMICS research on legal aspects and standards and is now about to be refined.

INTERNATIONAL COOPERATION WITH CHINA

Industry 4.0 is being talked about everywhere and is the subject of discussion in all branches of industry - not only in Germany, but all over the world. Few other terms are used more often in conjunction with new technologies and fundamental changes in development, production, use, maintenance and recycling of products and production systems in an increasingly interconnected world.

The implementation of technical requirements within global standardization systems is of particular importance for the globally active and export-oriented German industry. The target must be to embed all essential requirements for uniform technical functioning and applicability gradually in international standards. There is also great interest in countries like China, United States, Korea and Japan.

A new working group for Industry 4.0 (Intelligent Manufacturing) was set up on this basis at the meeting of the Sino-German Committee for Standardization in Chengdu in Sichuan Province in May 2015. The agreement between the DKE and SAC was signed on 28 Mai 2015. This provides a solid basis for joint cooperation, and further strengthens the bilateral relations with China. The cooperation was thus expanded to include Industry 4.0 and, alongside established fields such as e-mobility and smart cities, represents an important step for the future. The joint working group also represents a further development of the requirements formulated by the Federal Government to the entire Industry 4.0 sector.

5G - TURNING MOBILE TELECOMMUNICATIONS INTO THE TACTILE INTERNET

The ongoing development of communication requires networks which are not only faster, but also robust and secure. Research is being carried out here on wired solutions and also on the fifth generation of mobile technology (5G) which aims to supersede LTE and achieve speeds exceeding 1 Gbit/s.

In addition to higher transmission speeds, this should also pave the way for such concepts as the Internet of Things. The objective is to achieve an increase in capacity and guarantee real-time capability in the millisecond range. The ZDKI research programme (see page 18) is drawing up basic wireless principles for industrial applications and will be able to contribute these to the 5G development.

A further aim is to put people first, as reflected in the keyword 'Tactile Internet'. Tactile Internet denotes a reaction time of a few milliseconds which is indiscernible to humans. The Tactile Internet could help areas such as telemedicine or autonomous driving gain significant market relevance within a few years. An overview of the future potential is provided in the [VDE position paper](#) of the same name.

In addition to the European 5G Infrastructure Public-Private Partnership (5G-PPP), in which over 800 companies are investing in research along with the European Commission, there are numerous other national and European research projects. ETSI is also participating here as an associate member and as one of the three European standardization organizations recognized by the EU Commission. Relevant standards need to be developed in the coming years to bring the technology to market readiness. The DKE is already involved in numerous research projects aimed at incorporating future application requirements into 5G technology. Further information can be found on the [DKE Innovation Platform](#).

INFORMATION SECURITY FOR INDUSTRY 4.0

In the long run few companies will be able to ignore digitization and comprehensive interconnectedness. It therefore makes sense to address the opportunities and risks brought by ongoing digitization at an early stage. Industry 4.0 will only succeed and achieve market penetration if companies can safeguard their business interests. This involves protecting their know-how, policing their rights of use and, above all, ensuring the effective interaction of functional safety and IT security.

The [VDE-Trendreport 2015](#) reveals how security in its broadest sense is currently by far the biggest obstacle to the spread of Industry 4.0 in Germany. zeitig gilt es zu beachten, dass IT-Security-Mechanismen aus der „Office-IT“ der IKT-Branche nicht eins zu eins in die Prozess- und Automatisierungsbranche übertragen werden dürfen. Darüber hinaus müssen existierende Geräte im Einsatz und Technikbestände in angemessener Art und Weise geschützt werden – dies bedeutet, dass es einer entsprechenden Migrationsstrategie für die deutsche Industrie bedarf. Auch an diesem umfangreichen Aufgabengebiet arbeitet die DKE.

This is immediately apparent considering the effects which a hacker attack can have on manufacturing and production, e.g. bringing production lines to a standstill, or the minor manipulation of control systems which can ultimately have a major impact on product quality. This can have not only serious financial consequences, but also endanger the wellbeing of people and the environment.

The quest to find the „ideal security strategy“ must be led by the three key „CIA“ objectives - Confidentiality, Integrity and Availability - of IT security on the one hand and by the overriding safety requirements (protection of life and limb) on the other. The DKE is working in a cross-industry panel to create a VDE application guide which will contain recommendations on the systematic harmonization of IT security and functional safety issues, with the aim of resolving the discrepancy between IT security and safety. This work is being conducted on a cross-industry basis because these problems are of great relevance not only for Industry 4.0, but also in connection with other areas such as smart home, railway signalling systems, aerospace and nuclear technology.



For this reason the industrial automation systems in the VDE application guide are presented as a use case that will support manufacturers, system integrators and also operators. At the same time it is important to note that office IT security mechanisms from the ICT sector cannot be transferred directly to the process and automation industry. In addition, existing technical devices which are currently in use must be given appropriate protection. A suitable migration strategy is therefore needed for German industry. The DKE is also working on this wide-ranging task area.

DKE ACCOMPANYING RESEARCH TO THE „RELIABLE WIRELESS COMMUNICATION IN INDUSTRY“ RESEARCH PROGRAMME“

Wireless communication between distributed systems will be essential in the production world of Industry 4.0 in the future. Extremely low latency with low distortion (jitter) needs to be achieved to enable complex processes to be regulated and controlled. High communication reliability levels must also be established for environments with a high device density. Wireless systems currently used in industry such as WLAN® and Bluetooth® do not meet the real-time requirements at all, or only to a very limited extent, and also work in the already congested 2.4 GHz frequency band which has had to be heavily regulated with mechanisms such as Listen Before Talk (LBT), thereby limiting further application possibilities. This means that other future possibilities such as tactile man-machine interfaces or „augmented reality“ will only be possible with new wireless technologies which ensure high data rates with extremely low latency.

The „Reliable Wireless Communication in Industry“ research programme (ZDKI), which is funded by the Federal Ministry of Education and Research, examines well-known limitations, explores new wireless technologies and develops solutions and concepts aimed at meeting exacting realtime



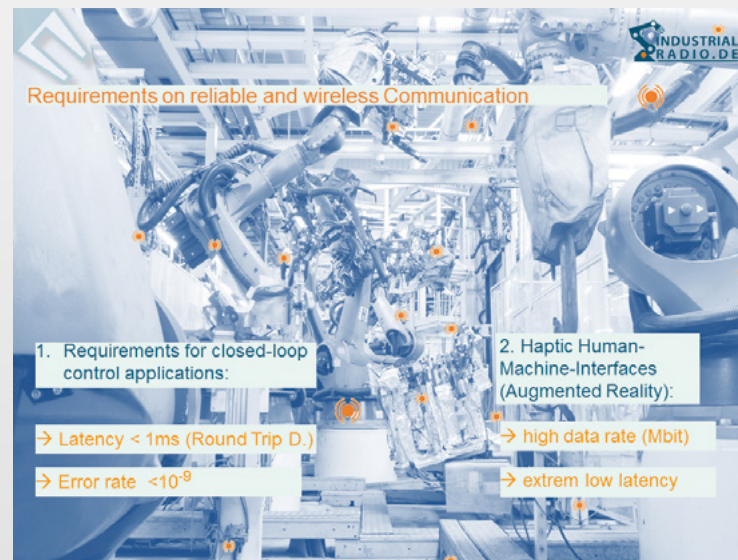
BZKI



requirements. Eight independent research consortia from industry and science are addressing this problem based on different use cases from industrial practice.

The eight projects are coordinated by the „Reliable Wireless Communication in Industry Accompanying Research“ (BZKI) consortium. This ensures that results are transferred inside and outside the support programme. The findings are consolidated in the form of standardization activities and, under the name „INDUSTRIAL-RADIO.DE“, support the excellent reputation of „Made in Germany“ products.

The DKE is supported in coordinating the accompanying research and the eight projects by the consortium partners: Institut für Automation und Kommunikation e. V. Magdeburg (ifak), Dresden University of Technology, Technical University of Kaiserslautern and Center for Computing and Communication Technologies (TZI) at Bremen University.



GRAPHENE - THE MIRACLE MATERIAL

Since Andre Geim and Konstantin Novoselov first isolated graphene in the laboratory at the University of Manchester eleven years ago, the new miracle material and its outstanding properties have been the focus of intense research efforts.

The one atom-thick honeycomb layer of carbon atoms is more tear-resistant than steel and an extremely good conductor of heat and electricity, but is also extremely flexible and transparent. Applications that could benefit from the use of graphene range from flexible electrodes and displays through to sensitive sensors and higher performance electronic components and batteries.

Since 2014, one of the European Union flagship projects has been dedicated to the two-dimensional material: the „Graphene Flagship“ is receiving 1 billion euros of funding over a period of 10 years, aimed at taking graphene out of the research lab and putting it into commercial applications. Standardization can and should support this process by defining measurement methods for the major properties of graphene and is therefore also part of the work programme of the research project.

The DKE initiated the CENELEC „Specifications for graphene-related materials“ workshop, which was officially launched in March 2015, to accompany these activities and to build a bridge from research to standardization.

The workshop links up the standardization activities of the Graphene Flagship with other EU-funded graphene research projects and the technical committees of international standardization organizations.

At present, the standardization efforts are primarily concerned with the consistent characterization of graphene. This is the basis for ensuring the comparability of materials supplied by different manufacturers and of industrial production, paving the way for the use of graphene in commercial products. Ongoing projects include those aimed at determining the number of graphene layers, measuring conductivity and evaluating structural quality.

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HEALTH

LIFE IS ELECTRICITY - ELECTRICITY IS LIFE

It is not only modern telecommunications technology which uses electrical impulses. Millions of years ago nerve cells „discovered“ how to transmit their information based on electrical action potential. The steadily beating heart - the precondition for all human and animal life - makes use of this mechanism. If it ever gets out of step, electrical impulses from a pacemaker can help the heart return to its normal rhythm.





When the artificial pacemaker was invented in the 1950s, nobody had any conception of just how successful and invaluable it would become for patients. Ever smaller and more reliable electronics are gradually reducing the risks for patients. And replacing parts is no longer a major task, thanks to standardized electrode connectors. The road to creating a standard is of particular importance in areas such as health. Both for patients, because their well-being depends on it, and also for the manufacturers of medical devices. The Medical Product Act provides the legal framework, whereas consensus-based standardization offers crucial orientation for manufacturers. The principle of multiple-assessor verification among the experts involved in drafting it provides the high level of safety which is necessary in such a sensitive area.



“In the future we will increasingly be making use of networked Active Assisted Living products.“ This will help us to stay healthy, both in our private and professional lives, and to minimize the effects of diseases or injuries and compensate for them. It is important to professionalize systems through standardization as a means of avoiding market fragmentation and of strengthening the emerging market. Such an approach is currently being drawn up by the IEC AAL System Committee.“

Janina Laurila-Dürsch

DKE Project Manager for AAL and Medical Technology

NEW: IEC SYSTEM COMMITTEES

committees under the Standardization Management Board (SMB) of the IEC. They liaise between the existing bodies and identify and address the cross-cutting standardization topics.

„ACTIVE ASSISTED LIVING“ SYSTEM COMMITTEE

The first system committee established by the SMB was the „Active Assisted Living“ SyC. It was set up to support and accelerate the commercial launch of AAL solutions.

The body met for the first time in Frankfurt in March 2015, signalling the start of active standardization in the AAL environment. AAL covers a wide range of fields from smart home applications through to medical engineering.

The task of the „Active Assisted Living“ system committee will be to professionalize AAL systems through standardization and thus strengthen the emerging market. An important part of the work is to identify gaps in standardization and areas of demand based on market trends and requirements. Particular importance is attached to cooperating with existing and future committees and organizations.

The system committee is planning to speed up standardization in the AAL environment and to promote the availability and accessibility of AAL systems and services. A further aim is to achieve cross-vendor interoperability of AAL systems and products. To achieve this, the system committee has set up specific working groups on issues such as interoperability and reference architecture, quality aspects and user requirements.



„SMART ENERGY“ SYSTEM COMMITTEE

The second IEC system committee - „Smart Energy“ - has an equally large field of activity. In order to optimize, network and control smart grids, the committee must serve as a point of contact for all standardization issues in this domain.

Yet smart networks are much more than just electricity grids. Electricity, gas, water and heat supplies are intelligently combined. The „Smart Energy“ system committee provides answers and solutions for the following areas:

- Smart Meters and Smart Home
- Decentralized energy generation
- Load management and distribution automation
- Interface definition for information security, data protection, electromobility and Power2Gas, water, heat etc.

The committee regards Smart Energy as an intelligent energy and control system of intelligent generators, storage facilities, consumers and transport equipment, supported by information, communication and automation technologies. The committee specifically defines high-level requirements for interfaces and functional requirements that can include the domains of several standardization bodies.

EMERGENCY AND HAZARD RESPONSE SYSTEMS (EHRS)

As recently as six years ago there were simply no comprehensive technical and/or organizational solutions regarding safety in public buildings. The need

and demand grew for school safety in particular, especially after the tragic shooting in Winnenden. The German Electrical and Electronic Manufacturers' Association (ZVEI) set up the first working groups in 2010 on this issue; these culminated eventually in a DKE working group. Representing the first milestones, parts 1 and 2 of the „Emergency and Hazard-Response Systems (EHRS)“ pre-standard were published as drafts in the first quarter of 2015.

The purpose of an Emergency and Hazard-Response System is to record events (emergency and hazard alarms), to forward them to a (technical) receiver and to display them in an appropriate manner to the relevant rescue service. By acknowledging receipt of the alarm, the rescue service assumes responsibility for verifying and initiating the measures defined in the risk management file. The party issuing the alarm receives suitable acknowledgment. An automatic or manual response is then set in motion to prevent any harm to persons and to terminate the triggering event and the alarm condition.

The first part - „Basic requirements, tasks, responsibilities and activities“ - describes technical processes and responsibilities for supporting all processes from the detection of an emergency or a hazard through to its resolution. It covers technical risk management including protection target definition, process organization, roles and the necessary requirements for a risk management file. The pre-standard lists the basic requirements for EHRSs in public buildings, such as educational institutions (e.g. schools, universities), government agencies, kindergartens and similar facilities, but can also be applied to non-public buildings with a similar risk profile and protection requirement. Part 2 contains supplementary requirements for emergency and hazard intercom systems (EHIs) and should be used together with Part 1 for the design, construction, commissioning, handover, operation and maintenance of such systems. These

serve to transmit emergency and hazard signals to a rescue organization for the remote evaluation of a situation by means of voice communication, and therefore to initiate appropriate intervention, protection and rescue action.

An EHI system can also transmit standard operating procedures and additional information and can be used for everyday communication. Depending on their security level, they offer high-level availability, end-device and permanent system monitoring. It is not the purpose of the pre-standard to prescribe large-scale investment. Its final product, rather, is the so-called risk management file, which describes how tasks, responsibilities, processes and possible technology should be documented, described and implemented. The pre-standard remains open-ended and serves as a guide to documenting and describing the demand and the objectives, and their execution. It defines a specific demand only in connection with a given degree of risk.

BETTER LIVING THANKS TO SMART HOME

Smart home has entered the vocabulary in recent years as a term for different technologies used in homes and buildings, in which networked devices and systems improve the quality of living, safety levels and the efficient use of energy. For years now, the technical and technological prerequisites have evidently been in place for mass-marketable smart home solutions. Nevertheless, the smart home is still only at the beginning of the roll-out phase. New smart home technologies, platforms, and global alliances have been formed.

Without a doubt, Germany is an important and growing market for smart home solutions, and German companies are leaders in many segments. Increasing competitive pressure at the international level and the formation of a variety of initiatives for various integration platforms and eco-systems characterize this trend.

Anyone taking a closer look at smart home applications will inevitably come across the concept of AAL (Active Assisted Living). This generally involves assistive technologies interacting with technology which allows users to perform tasks in a simplified way, or autonomously, which would not be possible without such technical support. Sensors installed in the home environment can record activities and request support as needed. There are clearly large areas of overlap in the smart home and AAL infrastructure. The use of integrated health and smart home technologies offers needs-based assistance and support to people and helps them retain their independence in the home environment.

The second version of the „Smart Home + Building“ Standardization Roadmap examines these topics and describes existing systems. In most cases these are only optimized for individual applications and do not permit an integrated solution. Here, the standardization roadmap helps pave the way for integrated smart home solutions, and thus help Germany in its quest to become the leading Smart Home market.



Photo: Jack - Fotolia.com



PUTTING PEOPLE AT THE CENTRE OF DIAGNOSTIC SYSTEMS

Medical examinations often involve calling upon medical laboratory services. Nearly two-thirds of all clinical diagnoses are based to a significant extent on laboratory tests. First of all a sample (e.g. blood) is taken from the patient. This is typically sent to a clinical laboratory in the hospital or to a large external laboratory. The relevant parameters are generally determined with the aid of stationary analysis devices. In recent years great progress has been made in the analysis methods, sensors, signal processing and sample evaluation, but there has also been a significant improvement in the performance of mobile devices. Both factors have resulted in miniaturized mobile diagnostic systems which permit patient-oriented in vitro diagnosis (IVD) outside the conventional central laboratory and require no special infrastructure for their operation.

These advantages have led to a steady increase in the importance of mobile diagnosis systems. There are significant technological, economic and regulatory challenges involved in marketing such systems successfully. Other future tasks include developing robust systems which are suitable for daily use, as well as integrating these into existing technical, informational and organizational environments and procedures.

The legal requirements for mobile diagnostic systems are defined in Germany on the basis of the relevant European directives and national legal and sub-statutory regulations. European legislation is currently being reformed, which is making additional demands on everyone involved.

Mobile diagnosis systems in the form of in vitro diagnostic medical devices can meet the basic requirements of European legislation through the application of harmonized standards. A large number of standards already exist which provide important assistance to the manufacturers of mobile diagnostic systems and their operators.

However, there are gaps in the standards because of the peculiarities of individual mobile diagnostic systems and as the result of technological progress. The purpose of the first German Mobile Diagnostic Systems Standardization Roadmap is therefore to provide assistance for the development, manufacture and application of mobile diagnostics systems. This includes:

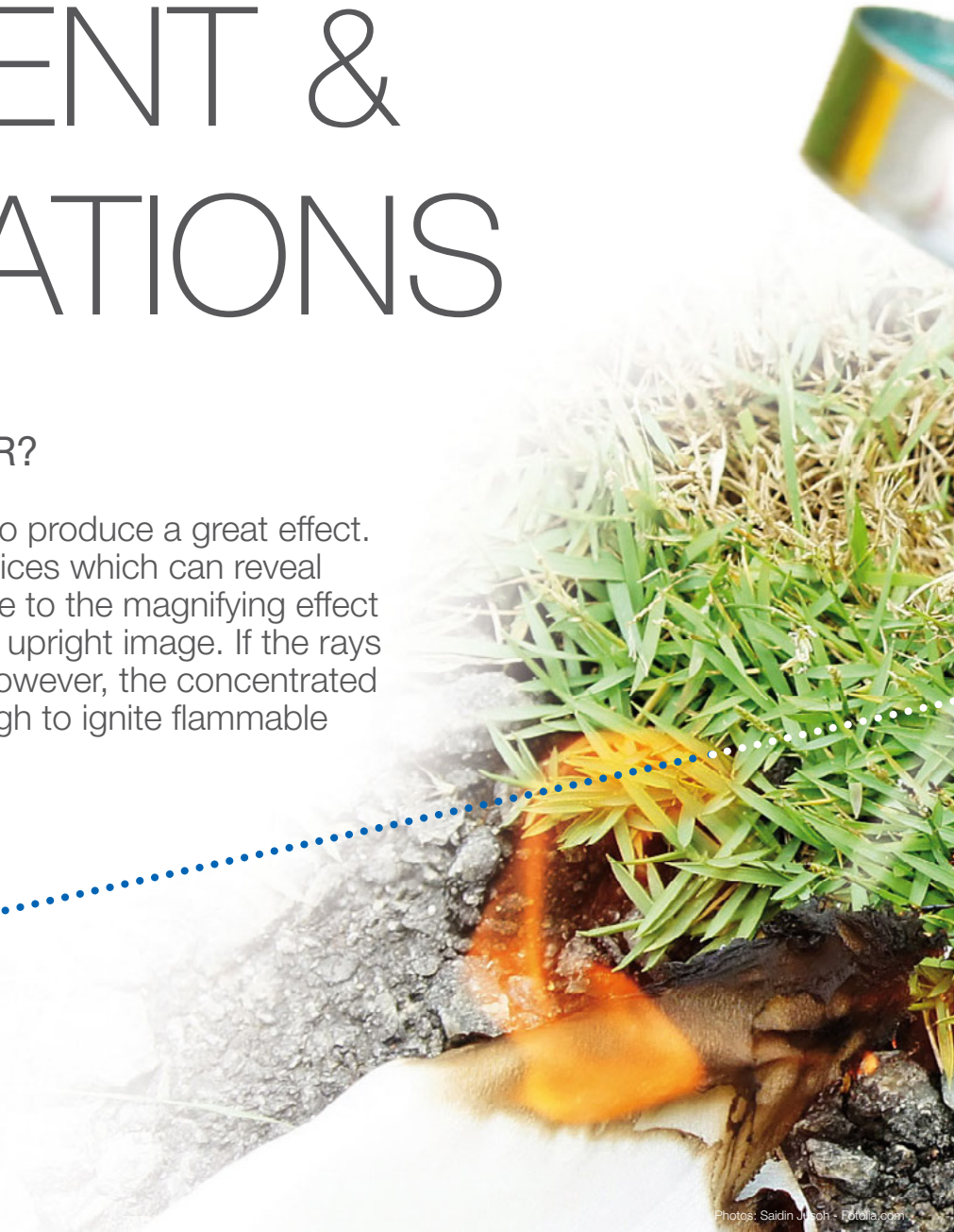
- Development and validation of analytical methods
- Consideration of regulatory requirements during development
- Interoperability
- Qualification of supplied parts
- Quality assurance of measurements
- Data security, collection and control
- Training and skills of users in a professional environment and
- Maintenance and repair of mobile diagnostic systems

Also, the reform of EU legislation requires the development or adaptation of normative documents on practical implementation.

EQUIPMENT & INSTALLATIONS

MAGNIFYING GLASS OR LIGHTER?

A small device is often all that is needed to produce a great effect. Magnifying glasses are simple optical devices which can reveal small details to the human eye. This is due to the magnifying effect of a convex lens which produces a virtual upright image. If the rays of the sun are refracted by such a lens, however, the concentrated light can raise the temperature high enough to ignite flammable material at the focal point.





As can be seen from the magnifying glass, even simple devices can hold a devastating potential for danger if energy is introduced. And the larger and more complex the (especially electrical) device, the greater the potential risks. Industrial plant and complementary installations can be rendered unreliable or even a danger to life and limb through incorrect handling, use with the wrong equipment or improper operation. When products perform as expected, we regard that as normal. We often don't realize what role standards play in improving their quality, safety, reliability, effectiveness and interchangeability.



“The DIN VDE 0100 (VDE 0100) series of standards contains provisions concerning the design, construction and testing of electrical low voltage installations and has made a major contribution to ensuring the safety of people and the environment but also to protecting property from danger and damage for over 120 years.”

Dirk Barthel

Full-time DKE staff member on Committee 221 for electrical installations and electric shock protection

SPRAYING SAFELY AND EFFICIENTLY

Many people probably associate the word „spraying“ primarily with graffiti, yet this ignores the diverse industrial applications for coating of a wide range of products. The automotive industry, machine tool manufacturers and makers of other mass-produced consumer products, for example, make use of stationary electrostatic spray systems which require no operator to be present in the paint booths during operation. It was therefore easy to improve the efficiency of such systems: by increasing the concentration of the coating and solvent and by increasing the discharge energy and the high-voltage current during the painting in the closed spray booth. However, hand-held spraying equipment is increasingly the medium of choice for products which are too large for paint booths or painting lines - in shipbuilding, for example - or for small production runs right down to individual products.

If the intention is to make portable spraying equipment more energy and resource-efficient and thus more environmentally friendly, the above options are of very limited use. The operators hold the spray gun in their hand and stand directly in the spray area, meaning that they are directly exposed to the potential hazard. The potential hazard of dangerous electric shocks, in particular, needs to be considered.

ANLAGEN & INSTALLATIONEN

Such deliberations are based on the DIN- IEC pre-standard „The Effects of electric current on human beings and livestock“ which stipulates maximum limit curves for dangerous body currents. The Physikalisch Technische Bundesanstalt (PTB) carried out a series of experiments to investigate whether the electrostatic spray guns currently used were keeping within these limit curves. It was found that the limit curves of the pre-standard were being kept well within. This means that it is possible to increase the operating current of the spray guns to increase their

efficiency. Yet it is still possible to stay well within the limit curves to avoid any risk to the operator.

These findings are to be communicated to the other national committees in the coming deliberations of the relevant technical body at the European level in an effort to raise the acceptance of this new approach and to have it taken into account in future work.



Photo: Kalitovskiy Dmitry, dmitry.kalitovskiy@gmail.com - Fotolia.com

PROTECTION INSTRUMENTATION - DETERMINING MEASUREMENT UNCERTAINTY

There is an element of truth to the maxim that „a measurement presented without a specified uncertainty level is a lie“. It is common - but misleading - practice to suggest a high level of precision by including many places after the decimal point. Meanwhile, two different readings of the same quantity may indeed be correct, despite the measured values differing.

An indication of uncertainty based on the ISO/IEC „Guide to the Expression of Uncertainty in Measurement“ (GUM) is required in DIN EN and DIN IEC standards for radiation protection dosimeters and similar instruments. The purpose of the new [VDE-Guideline](#) is to support the use of the GUM. The principle of the GUM is first presented using a very simple but concrete case; numerous examples are then given in five annexes.

Each annex focuses on a particular type of measuring device. The first example of each annex gives the total measurement uncertainty of a measuring device which meets all the minimum requirements of the product standard. The second example determines the uncertainty level based on additional information in a specific measurement.

The [VDE Guideline](#) developed by the „Radiation Protection Dosimeter“ committee contains two methods for determining the uncertainty, concrete information on the situations in which the two methods should be used, and finally a very simple method for deciding whether a measurement result is negligible or not.



Photo: Thermo Fisher Scientific Messtechnik GmbH

RETHINKING INSULATION COORDINATION

The energy revolution is raising the importance of applications such as photovoltaics and e-mobility in which DC voltages of several hundred Volts have to contend with special environmental influences such as condensation and pollution. This is making it necessary to challenge the existing insulation coordination findings. The aim now is to confirm or redefine the safety limits and to develop appropriate protection concepts and tests, ultimately leading to amendment of the relevant standards where required. This is the object of the Federal Ministry for Economic Affairs and Energy (BMWi) funded project „Insulation coordination: Assessment of clearance and creepage distances including ambient aspects in new applications“ (IsKoNeu), being carried out by the DKE along with the equipment and system manufacturer Bender GmbH & Co. KG.

Based on the theoretical insights obtained on the structure, influencing factors and testing of insulating materials, a first test series was set up and presented to experts from industry, skilled crafts and trades, associations and standardization organizations on June 30, 2015. The lifespan of the leakage path is influenced not only by the material properties or the coating of the path, but also by numerous environmental conditions such as the electrical and mechanical pressure, the temperature or the humidity. As many combinations of factors as possible and their relevance are to be analyzed using a number of demonstrators and two housing variants. The demonstrators have different conductor path clearances and coatings; DC voltages between 400 V and 1500 V are applied to these. The different housing openings result in different degrees of contamination. Environmental testing based on DIN EN 60068-2-38 is used to simulate continuous load in actual operation; this standard stipulates 240 hour cyclical

temperature-humidity tests in a climatic chamber. The insulation is deemed inadequate if it permits the current to flow in unintended paths.

The expertise of the professional public was incorporated in workshops and through the initiation of a dedicated project workgroup. Based on the results of the project, existing safety limits are either to be confirmed or pointers provided for subsequent in-depth investigation. At the same time, concepts and guidelines are to be developed for the creation and revision of normative documents. Once the project is complete these will be fed into the appropriate standardization processes at the international, European or national level to harmonize the limits and protection concepts in national, European and international regulations. Finally, scientific and public awareness publications will be developed. But even if the results of the project „merely“ confirm the limits, this would be a good result because it would remove current uncertainties for manufacturers.

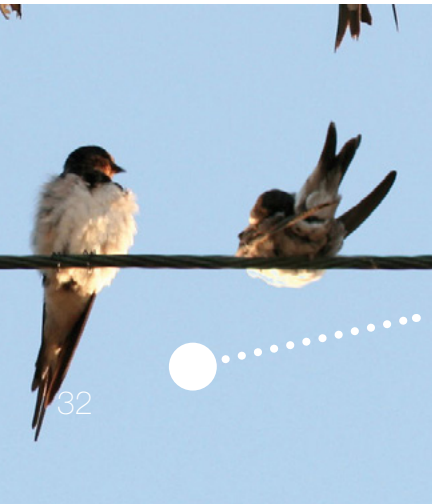


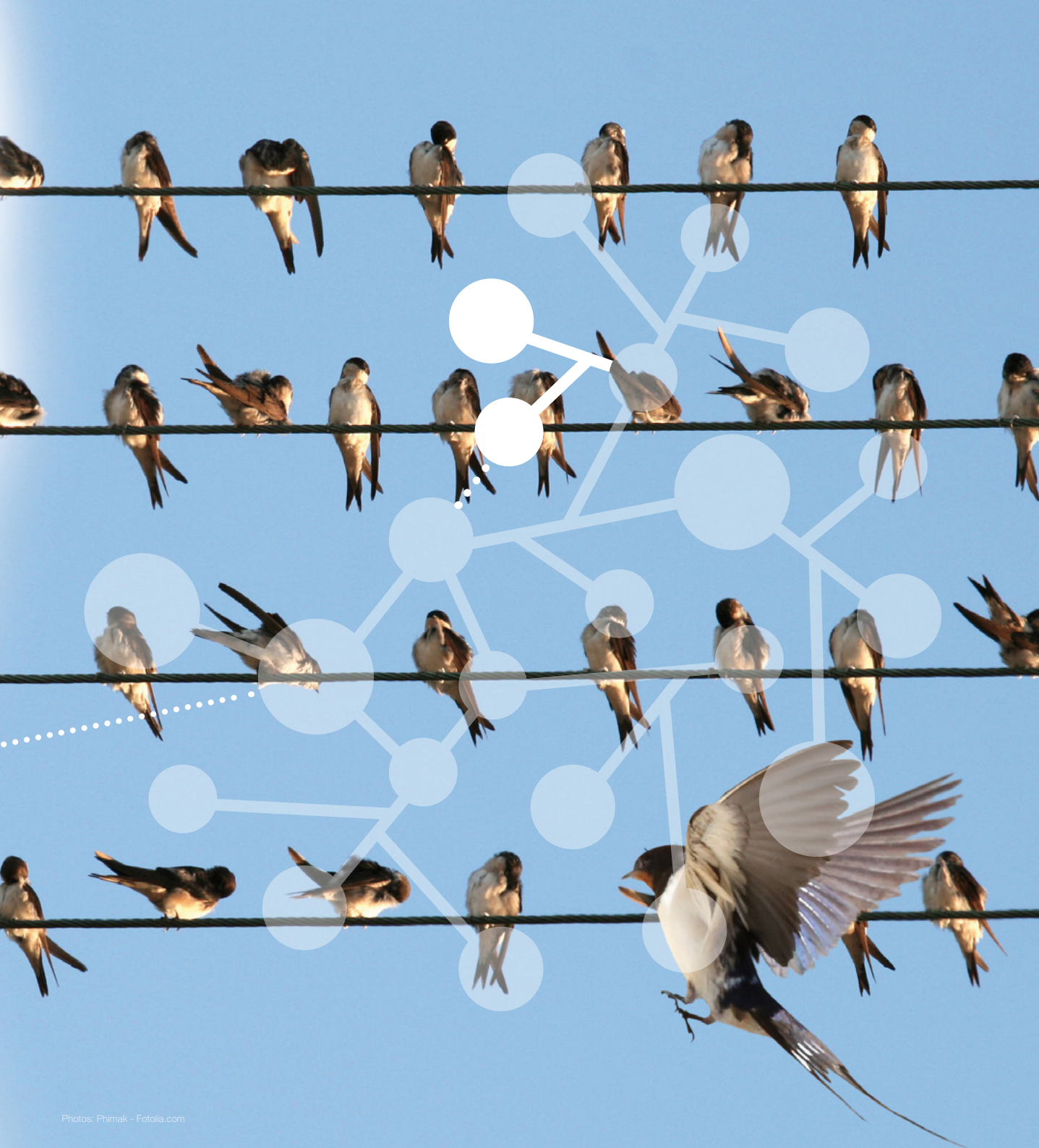
Concurrently with the IsKoNeu project, the „DC Low Voltage“ Standardization Roadmap was also drafted which, following its planned publication in early 2016, will also address insulation coordination.

INFORMATION & COMMUNICATION

IMMUNE TO SHOCKS?

Birds like to have a good view and use overhead lines as places to land and gather. They do so as a matter of course, naturally without any knowledge of electric potential differences and electrical circuits. Because as long as they only touch *one* line, there is no risk for them, as the circuit is not closed.





Every year, about 10,000 birds suffer fatal electric shocks; birds with a larger wingspan are most likely to be affected. They receive a dangerous electric shock if they simultaneously touch another line or the earthed pylon. To avoid this, protection measures have been drawn up under Article 53 of the Federal Nature Conservation Act. This calls upon electric utilities to convert their pylons to prevent electric shocks. The technical experts in the standardization bodies are needed to help formulate these protective measures. They have developed protective caps, for example, to enclose the cables near to the pylons in an effort at least to prevent short-circuits to earth.



“Data centres are the neurons in the nervous system of the digital society and have to serve a wide variety of business purposes. The individual technical solutions are therefore equally varied. With the publication of EN 50600, everyone involved in planning, implementation and operation now has access to a consistent body of standards which sets out the basic principles without inhibiting technical innovation.”

Thomas H. Wegmann
European Coordinator for
Data Centre Standardization

THE DKE AT FUTURE THINKING 2015 – A TRIPLE WORLD PREMIERE

The two-day „Future Thinking“ conference and trade fair is the flagship event of the German data centre industry not least because the „Deutscher Rechenzentrumspreis“ is presented in eight categories for innovative data centre products and solutions every year at an evening ceremony.

The event was held for the first time in 2015 at the Darmstadtium in the university city of Darmstadt. The DKE took the opportunity to present the first edition of its new series of DIN EN 50600 „Data centre facilities and infrastructures“ standards to a broad audience - a world premiere! A full-day conference block gave interested conference participants the chance to acquaint themselves with this globally unique series of standards. Roughly 50 interested parties seized the opportunity to discuss the essential requirements and the underlying philosophy with the main DKE experts involved in its development - including the Secretary of CENELEC/TC 215 and the head of the relevant work group. For the first time this series of standards provides all those involved in any capacity with the planning, implementati-



*Mike Gilmore, Managing Director
e-Ready Building Ltd.*

on and operation of a data centre with a comprehensive analysis of the facilities and infrastructures of a data centre, including basic requirements and recommendations.

The DKE also presented the new „Data Centre Standards“ starter package on its stand. Interested parties could obtain detailed information on this online product, as well as other VDE-Verlag products.

The lively discussions with the conference and trade fair visitors showed that the data centre industry is already enthusiastically applying this new system of standards - a great success for the DKE and its involvement in Future Thinking 2015.

ELECTRICITY FROM THE ETHERNET CABLE?

Powering IT devices via the network cable - commonly known as Power over Ethernet (PoE) - is enjoying increasing popularity. IEEE specifications published in 2003 and 2009 permit the device a maximum supply of 12.95 W or 21.90 W. But this is no longer sufficient for many applications today. Various proprietary solutions as well as a standardization project launched at the end of 2013 are now promising 100 W and more.

Does this mean that the end is now in sight for the 230 V power supply of network-powered equipment? Can we soon expect to see notebooks, printers, TVs and similar multimedia devices without tiresome external power supplies?

Can data connectors achieve the holy grail of introducing globally standardized electrical plugs through the back door?

What appears at first glance to be the egg of Columbus actually raises a number of questions on closer inspection. What does PoE mean for the communication cable networks which will then be required to transmit such high power levels in addition to their primary purpose of data transfer? Are the data cables which are used able to cope with the resulting thermal load? And what about electrical safety?

The DKE already addressed these and other questions some time ago in the European Committee for Communication Cable Systems. At present too little is known about the effects of the systematic and persistent use of a data cable - or entire bundles of cables - to transmit power. Under German leadership, CENELEC/TC 215 has developed a mathematical model which can be used to calculate of cable harnesses. An important



the expected warming aspect is the influence which the temperature increase due to the remote power supply has on the transmission capacity of the communication cable system. The cable attenuation is temperature-related, and so the the use of PoE will significantly reduce the currently

standardized path lengths in some cases. Each reduction must be individually calculated based on the cable used and the type of installation.

It has been shown that the target power of 100 W given in the specifications is feasible if certain conditions are met. However, the planners and installers of communication cable systems must comply with additional requirements in order to meet both the desired transmission technical characteristics and at the same time provide a power supply in the range of 75 W to 100 W. Appropriate new requirements and recommendations for this are currently being prepared and are to be added to the existing standards.

One thing is, however, already clear: no world-wide harmonized electrical plug will be introduced for Power over Ethernet.

IT SECURITY FOR CRITICAL INFRASTRUCTURES

In its „ICT 2020 - Research for Innovation - IT Security for Critical Infrastructures“ programme, the Federal Ministry of Education and Research (BMBF) is supporting eleven collaborative projects which are being coordinated by the accompanying „Networked IT security-critical infrastructures“ ([VeSiKi](#)) research project. The DKE has developed an IT security framework for critical infrastructures together with the consortium partners including the Universität der Bundeswehr München (consortium leader), the Friedrich-Alexander University of Erlangen-Nuremberg and the University of Bremen.

The DKE's role in the joint project is to ensure that the results of the individual projects are consolidated in standardization by alerting the relevant bodies of any

need for technical regulation. The DKE also supports the joint projects in the field of standardization for IT security. To this end, a „Standardization“ technical group was set up with representatives from the collaborative projects to develop and evaluate the standardization potential of the individual projects.



The overall project involves providing an online tool for standards in the area of critical infrastructure which gives operators and users an overview of the existing technical regulation landscape and to filter and order it based on certain criteria.

DKE WEBINARS - THE NEW WAY TO KNOWLEDGE

Video conferences in the form of webinars and on-line meetings are an indispensable part of today's online communication. They are gaining in significance because they are contemporary, eco-friendly and a genuine alternative to traditional seminars - especially where smaller learning units or specific pieces of knowledge are concerned.

The DKE uses this method of instruction and has been offering its own webinars since 2015. This is also in response to the requests and suggestions of young standardization experts (Next Generation DKE) and the VDE Young Professionals.

The objectives of the DKE webinars include:

- Target group-oriented treatment of VDE standardization topics
- Sharing knowledge about, and arousing interest in, standardization
- Raising the appeal of standardization among young engineers
- Providing specialist know-how for members in an easily digestible form.

As an online communication strategy element, webinars provide easy access to exciting topics and projects. The DKE webinars offer valuable expert knowledge on the chosen topic.

Participants are also given an opportunity to ask questions in the chatroom during the recording, which are then answered immediately afterwards. Recordings of the webinars represent further added value, because they can then be watched

almost anywhere at a later time. In addition, the „Like“ and „Share“ functions extend the reach of the information, as they give everyone the opportunity to see the videos on YouTube.

High acceptance levels were noted right from the five-part introductory seminar for standardization experts. Shortly after the announcements were made for the webinars 654 registrations were

made. In the period from July to December 2015 more than 18,000 minutes of webinar video footage were watched (> 12 days).

The recordings can be found in the [DKE Webithek](#) on our website and can be accessed from there.



THE DKE

CURRENTS WITH NO ELECTRICITY

Mountains symbolize stability, permanence and timelessness. The changes which occur are scarcely perceptible and take place over long periods. Currents are responsible for this - flows of substances like water, ice or wind which cause erosion. However, the resulting friction or electrochemical processes can also give rise to electrical currents in the form of earth currents which drift around above all in the upper crust.



It is human nature to take unsatisfactory circumstances and try and change them - a trait which also fosters progress. Such progress results in innovation - and there are close links between innovation and standardization. One of the DKE's tasks is therefore to recognize innovative and forward-looking issues which are of great significance for our economy and where there is need for standardization. The DKE stages a wide variety of events for just this purpose. Get-togethers such as the DKE Conference, the Call-for-Experts for standardization roadmaps, committee meetings and technical meetings provide the technical experts with plenty of opportunity to share their knowledge and experience. For the benefit of all.

REPORT ON THE DKE CONFERENCE 2015 - CHANGE IS BECOMING THE STANDARD

The „CHANGE IS BECOMING THE STANDARD“ DKE Conference was held on 6 May 2015 at the Büsing Palais in Offenbach. For the first time in his capacity as President of the DKE, Roland Bent welcomed the participating experts and set the tone for a varied programme focusing on the changes in technology and society.



After a joint morning session, the experts were able to choose one of three thematic forums in the afternoon.

THE DKE CONFERENCE

INTERNET OF THINGS (IOT)

In the Internet of Things Forum it became clear that the manufacturer-independent standardization of interfaces, data storage and services is making a major contribution towards establishing the IoT. In general, the Internet of Things revolution is taking place at the level of services: an endless stream of software-based services is being offered which is simultaneously changing the interface with the customer.

As digitization advances, people are being relieved of the need to perform many routine tasks. This makes work more varied, but problems can arise in complex activities when people, machines or programmers are taken to their limits.

INFORMATION SECURITY

There was broad agreement in the IT Security Forum: information security is a complex topic which requires comprehensive and exhaustive consideration. Threats from cyber attacks are ubiquitous in our networked world and are steadily increasing: they are becoming ever easier to carry out, more criminal, better organized and more covert. In the future the focus must be on implementing comprehensive „security engineering“ in an effort to put principles such as security and privacy-by-design into practice, especially in the context of standardization.

ECO-DESIGN DIRECTIVE

The first energy label was launched in the 1990s with the aim of saving energy. Since then, implementation of the eco-design directive has been a great success. Modern household appliances which are significantly more economical demonstrate this impressively. The strong support of experts in the standardization bodies has played a major role in this. More product groups will fall under the remit of the eco-design directive in the future as the success story continues.



DIE DKE IN 2015



CONFERENCE SUMMARY:

A lot has happened since the first standard was published. The ongoing technological development has demanded changes in the standards landscape. The conference gave an insight into the different areas of the electrotechnical future and made it clear that CHANGE has already become the STANDARD.

The presentations of the speakers in detail:

The Internet of Things – Change is becoming the standard – Dr.-Ing. Rico Radeke, TU Dresden; **Business models for IoT** – Johannes Stein, DKE; **The Internet of Things, services and people – Requirements and scenarios from daily practice** – Dr. Rainer Drath, ABB AG, Research Centre; **Industrie 4.0 – Its significance for human engineering** – Dr. Lars Adolph, BAuA; **Security by design – Challenges for clouds and mobile devices** – Prof. Stefan Katzenbeisser, TU Darmstadt; **Safety in home-, building and energy technology: Risks, solutions and standards** – Prof. Axel Sikora, Offenburg University of Applied Sciences; **IT security requirements and solutions for railway control and safety systems** – Prof. Jens Braband, Siemens AG; **Eco-design directive – An overview** – Christoph Wendker, Miele; **Eco-design requirements, based on example of vacuum cleaners** – Gert Jäckel, VDE Prüf- und Zertifizierungsinstitut GmbH; **Implementation of eco-design in standardization** – Prof. Rainer Stamminger, Universität Bonn.

AWARDS

PRESENTATION OF THE DKE AWARDS AT THE 2015 DKE CONFERENCE

Awards were presented for the eleventh time since 2005 to outstanding electrical engineering experts during the annual DKE Conference at the Büsing Palais in Offenbach. Roland Bent, President of the DKE, stressed the exceptional services which the three gentlemen have rendered for the benefit of standardization and the general public.

The following technical experts received a DKE Award on May 6 from Mr Bent:
Rudolf Cater (Gustav Hensel GmbH & Co. KG, Lennestadt)
Dr. Ingo Diefenbach (Westnetz GmbH, Dortmund)
Dr.-Ing. Martin Kahmann (Physikalisch-Technische Bundesanstalt, Braunschweig)



Dr. Bernhard Thies, Dr. Ingo Diefenbach, Rudolf Cater, Michael Teigeler, Dr. Martin Kahmann, Roland Bent at the DKE Awards ceremony

MICHAEL TEIGELER BECOMES SECRETARY OF THE GERMAN NATIONAL COMMITTEE OF THE IEC AND CENELEC

As of 1.7.15 Dr. Bernhard Thies (Chairman of the DKE Board of Directors and, from January 2016, President of CENELEC) handed over the duties of Secretary of the German National Committee of the IEC and CENELEC to Michael Teigeler (DKE Managing Director). Their joint goal is to pave the way for closer cooperation between the IEC and CENELEC, for stable European standardization and for the Standardization 2020 Programme.



IEC 1906 AWARDS

Each year the IEC honours the work of technical experts all over the world by presenting the IEC 1906 Awards, launched in 2004. The awards also serve as a reminder of the year in which the organization was founded.



We would like to offer our sincere congratulations to the 24 award winners from Germany! With their knowledge and their high degree of commitment they represent a major factor behind the excellent reputation which German standardization enjoys at the national, European and international level.

Dr. Rolf Behrens, PTB, Physikalisch-Technische Bundesanstalt; **Dieter Bindzus**; **Ewald Bockel**, Siemens AG; **Thomas Bömer**, Institut für Arbeitsschutz der DGUV-IFA; **Henry Dawidczak**, Siemens AG; **Dr. Edgar Dulni**, ABB AG; **Peter Ferstl**, Siemens AG; **Dieter Fietz**, TÜV SÜD Product Service GmbH; **Dr. Wilhelm Goldstein**, Prüfstelle für Strahlenschutz München; **Dr. Klaus Haverkamp**; **Erwin Heberer**, Gutachterbüro E.M. Heberer; **Alexander Jaus**, Avago Technologies GmbH; **Dr. Bernhard Klaußner**, Siemens AG; **Andreas Klink**, Teseq GmbH; **Rainer Knuff**, Siemens AG; **Lothar Laske**, BMW AG; **Peter Nowicki**, Andritz Hydro GmbH; **Hauke Peters**, ABB AG; **Dr. Holger Pufahl**, Siemens Healthcare Diagnostics Products GmbH; **Dr. Peter Renner**, DZG Deutsche Zählergemeinschaft Messtechnik; **Dr. Reinhard Salfner**; **Andreas Schneider**, Sony Deutschland GmbH; **Dr. Bernd Schulz**, ITRON Zähler & Systemtechnik GmbH; **Dr. Karl-Heinz Weck**, FGH, Forschungsgemeinschaft für Elektrische Anlagen und Stromwirtschaft e.V.

THE DKE IN 2015

DKE SCIENCE TO STANDARDS (STS) PROGRAMME

As part of its efforts to promote budding engineers, the DKE has invested a great deal over the years both in the future of standardization work and in the promotion of young talent. We support students in their diploma, Bachelor's or Master's theses, not only by offering technical and normative but also financial assistance.

As in previous years, a number of students were again supported in 2015. The range of topics extended from sustainable energy supply through to gesture-based robot control. By November 2015 three graduates had completed their theses and were given the opportunity to present them. The jury, consisting of the attending supervisors and VDE employees, had the task of selecting the best thesis. The solution-finding process was evaluated, for example, as were the objectives achieved, the presentation and the benefit to the DKE. Mr Colin de Vrieze managed to convince the jury in these regards and was declared the winner of the first prize in the 2015 STS Programme based on his academic excellence, his practical implementation and the direct connection of his topic to standardization. Congratulations to the proud winner! In his thesis entitled „Design and implementation of a bidirectional power line communication system for intelligent lighting systems“ he developed and evaluated a complete system design which can be used for



Colin de Vrieze

the intelligent control of lighting systems based on existing wiring.

Our thanks also go, of course, to Messrs Tomaj Najafi and Andreas Kunze, whose submissions were also well received by the appropriate bodies.



Andreas Kunze

success in their careers and all the best for the future!

Mr. Kunze's thesis „Status monitoring of an HRC fuse“ evaluated a diagnostic method for monitoring high-voltage high-current fuses, thereby helping to prevent uncontrolled blowing of the fuses. In his thesis entitled „DC networks in the energy supply“ Mr. Najafi examined the feasibility of using DC voltage in the low voltage range and compared different approaches.

All the participants were able to benefit from the theses and gained new insights. We would like to wish them all every



“The online communication strategy represents the logical continuation of the DKE mission and implements its core values of dialogue, competence and commitment.”

Jens Viebranz
Project Manager DKE

SOCIAL MEDIA - DIALOGUE THROUGH NEW MEDIA

The use of new media is constantly increasing in the digital age. Digital points of contact have established themselves alongside television, radio and print: consumers now often encounter a product, brand or service for the first time in social networks.

IMPORTANT ONLINE PRESENCE

The media have penetrated every single aspect of our political, economic and private lives. Consumers can now obtain information or compare notes easily and quickly via social media, increasing the demands on communication for the providers. This of course does not make traditional media superfluous in the digital age. Print products will continue to be an integral part of the media landscape in the future, as they are used as an important source of information by the relevant stakeholders. For the DKE this means striking a balance between traditional and new types of media. To disseminate its content the DKE needs an integrated, cross-media mix of online and offline media in order to offer the optimum media channel to all target groups. The DKE has now developed a strategy specifically for the hitherto neglected online communication, including social media. The organization is now called upon to publish more high-quality content and make it available to its target groups.

COMPANIES NEED MEDIA STRATEGIES

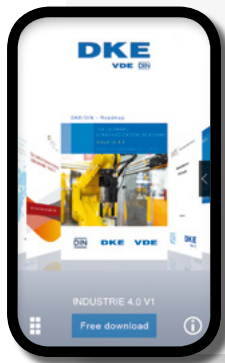
In 2015, the DKE shifted its focus to the Twitter and YouTube social media platforms. Storify also served as a supportive platform. This means that presentations and interviews on the DKE events etc. can now also be viewed on YouTube. Recordings of webinars made this year can also be found there. The flow of information and access to the DKE's exciting standardization

THE DKE IN 2015

projects are therefore now on a sustainable footing. The latest news and results as well as live information from the events can be followed on Twitter (@DKEAktuell).

THE DKE APP

For some years now, the DKE has had a mobile app that allows users to access the main free publications of the DKE. A complete overhaul has considerably expanded the scope of the app. Free publications are still provided in the same way as before. What is new is that they are now updated on a daily basis and users can receive immediate notification via push messages. Another new feature is that the app is now available for the first time for the most popular mobile device operating systems. Further, additional functions are offered via an expanded menu. The user can access the homepage of the DKE from here and can communicate on the DKE social media platforms



both in the preparation, processing and use of standardization documents as well as in the cooperation within and between the different bodies. If standardization wishes to maintain its strong social reputation, it must embrace digital transformation and align itself to the new requirements for products and services in a forward-looking way.

Standardization 2020 is a change process and an integrated digital approach to electrotechnical standardization.

The DKE has therefore launched its 2020 Standardization programme, representing a new era of standardization for products, services and applications throughout the field of electrical engineering, electronics and information technology. Unlimited safety for people, animals, objects, maximum quality standards in the production and application of electrical products and in the distribution of energy are the supreme goals of standardization. To ensure that this remains the case in the future, these goals must be fully translated into the digital world and supported by appropriate procedures. Standardization 2020 represents a melting pot of ideas, a discussion platform and a driving force, all aimed at putting the necessary permanent measures into place in close cooperation with our experts in specific individual projects. Supported by the latest technical methods, the focus of Standardization 2020 is on the strategic orientation and continuous improvement of all products, services and processes serving the digital world, for the benefit of standards and technical experts. The results of Standardization 2020 are opening up new opportunities for the rapid dissemination of technical knowledge and for promoting innovation all over the world. It is all about taking responsibility, seizing the initiative and spotting opportunities - as a means of helping standardization to shape forward-looking change.



STANDARDISATION IN THE DIGITAL WORLD

The changing times are also affecting standardization. It was not too long ago that standards were written on typewriters and changes had to be made using scissors and glue. Thanks to the rapid development of computer and software technology, these archaic tools have now given way to electronic data processing - for the benefit of all concerned. And the use of the latest computing and communications technologies has suddenly opened up entirely new opportunities

NORMUNG 2020



“With our experience and our commitment, we DKE staff work together with our technical experts to ensure a securely networked future.”

Klaus-Wolfgang Klingner

DKE standardization expert in Household Appliances

THE ORGANIZATION

The DKE is the nationally and internationally recognized platform for electro-technical standards:

- German member of the IEC International Electrotechnical Commission, Geneva
- German member of the CENELEC European Committee for Electrotechnical Standardization, Brussels
- The national standardization organization of the ETSI European Institute for Telecommunications Standards responsible for Germany, Sophia Antipolis

STRUCTURE OF THE DKE

Standardization is a joint effort: companies and organizations in industry, public authorities and other institutions that support the work of the DKE both financially and by sending technical experts, together constitute the DKE union of sponsors. [The Council \(LA\)](#) lays down the basic principles of the DKE. The chairman of the Council represents the DKE, both within the organization and in public.

The Council is assisted by advisory boards that are responsible for the major areas under its purview:

- Technical Advisory Board International and National Coordination ([TBINK](#))
- Technical Advisory Board ETSI ([TBETSI](#))
- Technical Advisory Board Evaluation of Conformity ([TBKON](#))
- Advisory Board Technology (BKT)
- Finance Advisory Board

The Council also represents the German committees of the IEC and CENELEC.

THE DKE IN 2015

THE DKE OPERATING PRINCIPLE

The total sales of the German electrical and electronics industry rose by roughly 0.6 % to approximately EUR 178 billion in 2015. This impacted upon exports which increased by around 7.1 %; exports account for approximately 90 % of total sales. Accordingly, the work of the DKE is internationally oriented towards the IEC, and nationally structured in such a way that the DKE bodies are generally assigned as counterparts to the international bodies, while also taking CENELEC into account. Roughly 80 % of European standards correspond to the results of the IEC work: this demand-oriented focus on international standardization also constitutes the basis for ongoing development of the internal European market – yet without being confined to the markets of Europe.

To help develop innovative fields and to coordinate cross-product system requirements, all nine technical divisions of the DKE and their standardization bodies, plus the Standardization and Innovation division, are supported by Excellence Clusters for specific topics which also work closely with other organizations, the VDE technical societies and the DIN bodies.

STRUCTURE OF THE DKE BUSINESS ORGANIZATION



[Organigram](#)

THE BASIS OF OUR WORK

The DKE German Commission for Electrical, Electronic & Information Technologies of DIN and VDE was established in 1970 by the VDE and DIN. It operates on the basis of the Standards Agreement of 1975 between the Federal Republic of Germany and DIN.

The DKE constitutes a joint organization of DIN German Institute for Standardization [DIN Deutsches Institut für Normung e.V.] and the VDE ASSOCIATION FOR ELECTRICAL, ELECTRONIC & INFORMATION TECHNOLOGIES [VERBAND DER ELEKTROTECHNIK ELEKTRONIK INFORMATIONSTECHNIK e.V.] – the VDE is responsible for the daily operations of the DKE.

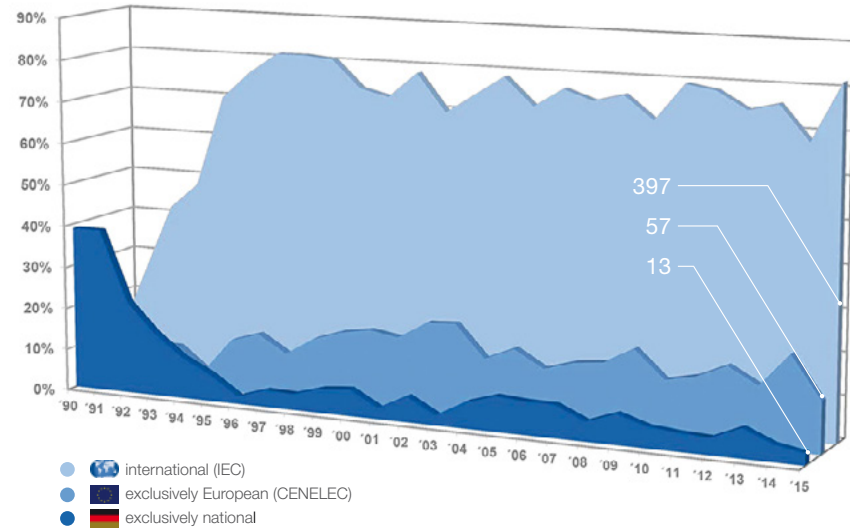
The standards issued by the DKE are part of the German collection of standards. If the standard in question contains safety provisions, it is also included in the VDE Specifications Code of safety standards. The results of the standardization work by the IEC and CENELEC, along with the European standards of ETSI, are published in Germany by the DKE in accordance with the rules stipulated by DIN. The crucial elements of standardization in this respect are the public enquiry procedure and the principle of consensus. In its standardization activities, the DKE actively provides needs-based support for the drafting of national, European and international electrical, electronic and information technology standards designed to promote innovation and assist development.

If safety and environmental aspects are involved, regardless of the technical bodies of the DKE, the results of the standardization work may also be published as VDE application guides, with or without public enquiry procedures.

FIGURES

IEC STANDARDS 2015	Figures up to 31/12/2015	published in 2015
IEC standards	6.195	418
IEC/TS	244	26
IEC/TR	440	35
IEC-PAS	43	8
Final drafts (FDIS)	71	315
Drafts (CDV)	207	430
New projects (ANW + Maintenance)	-	334
CENELEC STANDARDS 2015		
EN	6.296	507
HD	233	2
CLC/TS	75	9
CLC/TR	109	15
Ongoing projects	999	-
prEN + prHD	-	69
ETSI STANDARDS 2015		
EN	1.346	46
ES	319	26
TS	1.929	2.024
EN drafts	-	69

ORIGIN OF ELECTROTECHNICAL DIN STANDARDS - 1990 TO 2015



DKE STANDARDS 2015	Figures up to 31/12/2015		2015 erschienen	
With VDE classification	Number	Pages	Number	Pages
DIN standards	2.952	98.217	360	15.220
Drafts	902	56.856	310	19.108
Manuscript procedure	-	-	12	367
Application guides	35	804	5	126
Without VDE classification				
DIN standards	3.674	93.736	143	7.881
From the ETSI area	1.911	85.683	37	1.845
Drafts ¹	496	37.723	161	9.733
MV ² from the ETSI area	-	-	40	2.050



¹ Excluding co-authorship and excluding work results from ETSI

² Manuscript procedure

THE ORGANIZATION

OUR OBJECTIVES

SAFETY

Overall safety for electrotechnical products, installations and their related services, also in the field of occupational safety.

COMPATIBILITY

System compatibility of products and installations in networked systems and applications

MARKET ORIENTATION

Accelerated market penetration of new technologies by supporting information processes via standards and specifications

CONSENSUS BUILDING

Bringing together the knowledge and the interests of all relevant parties, building consensus even around controversial technical issues.

REPRESENTATION OF INTERESTS

Representing German interests in the development of international and European standards in order to eliminate obstacles to trade and to open up markets worldwide.

QUALITY

Maintaining a high level of up-to-date technical rules in a consistent and widely accepted portfolio of standards which are oriented towards market and consumer requirements.

CONFORMITY ASSESSMENT

Worldwide acknowledgement of conformity assessment results.

EXPANDING THE HORIZON

Encouraging dialogue, safeguarding expertise and enhancing commitment: these are the maxims of the DKE and the factors involved in evolving the full power of standardization: for comprehensive safety of electrotechnical products

in the interests of the consumer and the environment. Global opening of the markets by augmenting system compatibility and removing technical trade barriers. Successful development and swift implementation of technical progress for the sake of society as a whole.

ENCOURAGING DIALOGUE

The DKE is the platform for results-oriented dialogue in the development of generally accepted electrotechnical standards. With a focus on consensus, we bring together the know-how, information and interests of all relevant groups and publish the results as part of the German standards collection and the VDE Specifications Code of safety standards.

SAFEGUARDING EXPERTISE

The DKE is the official German expertise centre for electrotechnical standardization. We represent German interests in the European and international standardization organizations and implement the results of international standardization work in the national standards collection.

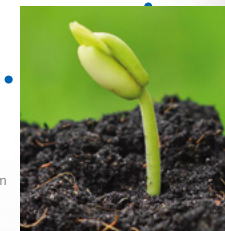
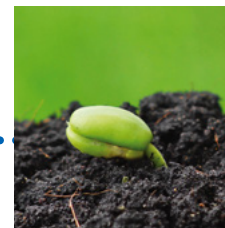
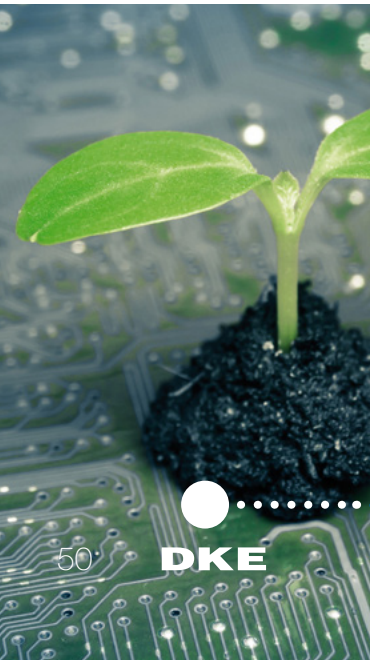
ENHANCING COMMITMENT

The DKE lives from the commitment and honest cooperation of all parties involved: technical experts contribute their know-how, companies provide resources, the DKE staff organizes the processes efficiently and provides corresponding support with a wide range of services. Our joint objective is to create acknowledged, market-oriented, state-of-the-art standards. And progress as the result of positive change.

OUTLOOK

ELECTRICITY AS FERTILIZER?

At the beginning of the 20th century science took an intensive interest in electroculture. This was a collection of methods aimed at positively influencing plant growth and crop yields through the use of electricity. And indeed, cabbage plants which had been treated with electricity yielded heads of cabbage that were more than twice the size of the conventionally grown plants of the previous year. In addition to the increased yield, the reduced need for water and prolonged period of use represented further benefits.





People have been exploiting electricity - be it of natural origin or artificially generated - for many decades: to make work easier, for health and entertainment and countless other purposes. They have developed and improved a great deal, but have also always had to be mindful of the dangers involved. The DKE network allows researchers and developers to sit down at the same table with manufacturers and standardizers or authorities. They all have a stake in our modern understanding of safe living, with: **STANDARDIZATION NETWORKING THE FUTURE!**



“Our biggest challenge is change - we don't just want to react to it, we want to actively shape it.”

Michael Teigeler
DKE Managing Director
#IECGM16

Connecting Communities – Reinvent Standardization: DKE to host the 80th IEC General Meeting in Frankfurt

The 80th IEC General Meeting from 10 to 14 October 2016 in Frankfurt am Main will be the top electrical engineering event in the global standardization calendar. This will be the sixth time that the German IEC Committee in the form of the DKE has hosted this major event. It reflects the importance of the German electrical industry and the strong reputation it enjoys worldwide.

Over 120 technical committees have registered to attend the conference, with up to 2,500 technical experts participating and forming the nucleus of the efforts to advance current standardization projects. As usual at the general meeting, all the IEC governing bodies will be convening and, in addition to the strategic and political issues, will also be discussing the future of standardization - with „Connecting Communities - Reinvent Standardization“ on the agenda.



**IEC 80th
General Meeting
Frankfurt 2016**

connecting communities
reinvent standardization



DKE
VDE DIN

OUTLOOK

Exciting and interactive social events will make for an inspiring dialogue within the IEC community. In addition, the DKE as host will be presenting a further, new dimension - the Reinvention Laboratory - for the first time.

The standardization system is undergoing a period of change, not least because of the all-embracing digitization of our world. Against this background, the Reinvention Laboratory will provide a platform for presenting, discussing and promoting a wide variety of standardization policy ideas and concepts, strategies and visions - allowing them to become part of a development that will provide solid results in global electrotechnical standardization in the future and, not least, give the electrical engineering industry a solid basis for the further development of markets.

The 80th IEC General Meeting in 2016 is set to be a very special occasion, which is due in no small part to the sponsors. As part of the specially developed-, added-value sponsorship packages they are making both a financial and also a substantive commitment to the success of this unique major event.

The 80th IEC General Meeting is being managed and developed by the highly committed DKE project team. The 40 or so team members have been working since the end of 2014 on ensuring that the upcoming event is an exceptional international event.

The DKE President, Roland Bent, and the DKE Managing Director, Michael Teigeler, were handed the baton at the 2015 IEC General Meeting in Minsk where they used a presentation film and the launch of the official event website to give a first taste of the IEC General Meeting in 2016 in Frankfurt.

You can find all the latest details and further information about the 80th IEC General Meeting 2016 on the website at www.iec2016.org



Danke

We would like to thank all experts, staff members and members of the steering bodies for their commitment.

PUBLISHER

**VDE ASSOCIATION FOR ELECTRICAL,
ELECTRONIC & INFORMATION TECHNOLOGIES.**

Responsible for the daily operations of the

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Unattributed images: DKE

This interactive version of the
DKE Annual Report can be found
on our homepage
www.dke.de/jahresbericht
(also available in the app)

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Division 5 : Electrical appliances for domestic and similar purposes, installation equipment KLAUS-WOLFGANG KLINGNER, Silke Bachus, Thomas Brüggemann, Alexandra Bugiel, Hans Finke, Uwe Junglas, Maria Munoz Rodriguez, Frank Steinmüller

Division 6 : Electronic components for telecommunication and electronics THEODOR BERND LIEBER, Sonja Diemer, Rainer Difflipp, Dieter Hinterwaller, Ingrid Hummel, Reinhold Pichler

Division 7 : Information and telecommunication technologies BERND SCHWARZZENBERGER, Klaus-Peter Bretz, Nicola Fortong, Gabriele Gulis, Gerhard Henninger, Birgit Hofmann, Regine Kornetzky, Silvia Muszter, Henryk Sieradzki, Harald Theis, Thomas H. Wegmann

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