



We are kommmitmenschen

DGUV PREVENTION YEARBOOK 2017

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*“kommmensch” is a long-term campaign to establish a culture of prevention. The German name of the campaign is a play on words: it can be translated loosely as “hey, come with us”, whilst also playing on the English word “commitment”.



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GLOSSARY

BAuA German Federal Institute for Occupational Safety and Health
 BG BAU German Social Accident Insurance Institution for the building trade
 BG ETEM German Social Accident Insurance Institution for the energy, textile, electrical and media products sectors
 BGN German Social Accident Insurance Institution for the foodstuffs and catering industry
 BG RCI German Social Accident Insurance Institution for the raw materials and chemical industry

BG Verkehr German Social Accident Insurance Institution for the transport industry
 BMAS German Federal Ministry of Labour and Social Affairs
 BMG German Federal Ministry of Health
 BMZ German Federal Ministry for Economic Cooperation and Development
 DGUV German Social Accident Insurance
 DIN German Institute for Standardization
 DRV German pension insurance institutions
 DVR German Road Safety Council

Fraunhofer IAO Fraunhofer Institute for Industrial Engineering
 GDA Joint German OSH Strategy
 GIZ German Society for International Cooperation
 GKV-SV Umbrella association of the German health insurance funds
 IAG Institute for Work and Health of the DGUV
 IFA Institute for Occupational Safety and Health of the German Social Accident Insurance

IPA Institute for Prevention and Occupational Medicine of the DGUV
 ILO International Labour Organization
 IOSH Institution of Occupational Safety and Health
 ISSA International Social Security Association
 KAN Commission for Occupational Health and Safety and Standardization
 KOSHA Korea Occupational Safety and Health Agency
 LASI Commission of the German regional governments for occupational safety and safety engineering

MAK Permanent Senate Commission of the German Research Foundation for the Investigation of Health Hazards of Chemical Compounds in the Work Area
 OECD Organisation for Economic Co-operation and Development
 SVLFG Social insurance for agriculture, forestry and landscaping
 TFEU Treaty on the Functioning of the European Union
 TRGS Technical rules for hazardous substances
 TÜV Technical Inspection Association

UK NRW German Social Accident Insurance Institution for the public sector in North Rhine-Westphalia
 UK RLP German Social Accident Insurance Institution for the public sector in Rhineland-Palatinate
 VBG German Social Accident Insurance Institution for the administrative sector
 VDE Association for Electrical, Electronic & Information Technologies
 VFA Association for the Promotion of Occupational Safety in Europe
 WHO World Health Organization



► Chairmen of the Board of the DGUV: Dr Rainhardt Freiherr von Leoprechting and Manfred Wirsch

MAJOR LEAPS FORWARD

Evidence-based prevention activity requires facts, figures and data. Indicators and evaluations are used routinely in the German social accident insurance system to describe prevention of occupational and commuting accidents, occupational diseases and work-related health hazards, the efficacy of campaigns, etc.

This foreword is inevitably too brief to describe these indicators and evaluations in their full breadth and depth. A brief glance at them, though, is insightful. In 2016, we recorded 424 fatal occupational accidents and 311 fatal commuting accidents. These annual figures are the lowest ever recorded. The risk of suffering an occupational accident at all presents a similar pattern: at 21.9 reportable occupational accidents per 1,000 equivalent full workers, this value has also reached a historic low.

In 2010, the corresponding figures were 519 fatal occupational accidents, 367 fatal commuting accidents, and a risk of 25.8. A decade earlier, in 2000, 918 and 794 fatal occupational and commuting accidents respectively had been recorded, and an accident risk of 38.6. Although still relatively recent, these figures now appear astonishingly high. The trend demonstrates clearly the success of our Vision Zero strategy – the vision of a world without severe or fatal occupational accidents and diseases.

Is this decline in the accident figures a self-fulfilling prophecy? Far from it. We are familiar with the scientific concept of marginal benefit: the more the figures are reduced, the harder it is to attain further improvements. Year after year, we must

work on the technology, organization within companies and motivation of the individuals involved, in order to improve workplace safety and health even further.

In the modern world, international networking is particularly important in this context. Rather than reinventing the wheel, we begin by looking for strategies that already exist in other countries. This is why the World Congress on Safety and Health at Work, held by the DGUV in Frankfurt in 2014, was so important. This is also why our internationally networked risk observatory, with which we identify risks before they reach the workplace, is particularly relevant.

Publication of this Yearbook on 18 October 2017 marks the launch of our prevention campaign under the heading “kommitmensch – Safe. Healthy. Together.” We expect the campaign to result in a major leap forward: the establishment of a culture of prevention by which safety and health become values for each and every individual and organization and for society as a whole, and are consequently embodied in every action.

An ambitious target, certainly. But our vision includes many more great leaps in prevention, until all workplaces are safe and healthy.

Dr Rainhardt Freiherr von Leoprechting

Manfred Wirsch

PREVENTION CULTURE



The work of KOSHA is based on Human Respect originated in the form of 'Hongikingan', the national founding principle of Korea meaning 'We benefit people all around the world'.



Young Soon Lee,
KOSHA President



SAFETY IS THE FOUNDATION OF OUR LIVES

Interview with Young Soon Lee, President of the
Korean Occupational Safety and Health Agency (KOSHA).

In 2008 in Seoul at the XVIII World Congress on Safety and Health at Work the topic of a Culture of Prevention was put on the political agenda for the first time. What is the aim and what are the main core messages

Seoul Declaration:
<http://www.seouldeclaration.org/en/About-the-Seoul-Declaration>

of the Seoul Declaration “Promoting a worldwide Culture of Prevention”?
The overall aim of the Seoul Declaration is: First, safety and health at work is recognized as the responsibility of society as a whole. Second, priority is to be given to occupational safety and health in national agendas. Third, a national preventative safety and health culture is to be built and maintained.

KOSHA was established in 1987. From the very beginning the focus of KOSHA’s work lay on prevention. What was the impact of the Seoul Declaration on the work of KOSHA?
KOSHA promotes the Seoul Declaration on Safety and Health at Work, which was adopted during the 18th World Congress on Safety and Health at Work in 2008. Following the Seoul Declaration, KOSHA took over responsibility

for the dissemination of its mission. A joint secretariat comprising ILO, ISSA and KOSHA was established, as was a dedicated website.

So far, the ILO, the ISSA and KOSHA have launched a variety of activities to implement the Seoul Declaration worldwide. At many other OSH events and conferences, statements in support of the Seoul Declaration have been signed. In 2009, KOSHA also won the bid for the 31st ICOH Congress in 2015, which was held in Seoul.

By successfully hosting the World Congress and the ICOH Congress, KOSHA contributed notably to the enhancement of industrial safety and health and to the expansion of a worldwide culture of prevention.

In 2011 KOSHA was chosen to be the chair organization of the ISSA International Section for a Culture of Prevention. How would you describe the mission of this section? What is its current priority?

The mission of this section is: Firstly, to promote a preventative safety and health culture through global collaboration in order to achieve the objectives of the Seoul Declaration. Secondly, to provide a platform for coopera-

tion to enhance a worldwide culture of prevention and to share knowledge and experience.

The current priority of the section is the development of indicators to monitor the development of a culture of prevention.

With an agreement between the Korean Occupational Safety and Health Agency (KOSHA), German Social Accident Insurance (DGUV), Finnish Institute of Occupational Health (FIOH), Institut national de la recherche et de sécurité (INRS) and Institution of Occupational Safety and Health (IOSH) to develop indicators for a culture of prevention, the Board Meeting of the section at the International Symposium on the Culture of Prevention 2013 in Helsinki proposed that Ms. Jane White conduct a literature review on indicators for measurement of a culture of prevention.

As a result, Ms. White presented 10 indicators for a prevention culture at the Symposium entitled “Establishing a prevention culture” organized by KOSHA at the XX World Congress on Safety and Health at Work 2014 in Frankfurt.

Based on the work by Ms. White, a team of researchers from KOSHA and DGUV worked on further development of the International Leading Indicators

for a Culture of Prevention. The joint work took place from 7 November to 16 December 2016 at the Institute for Work and Health of the DGUV.

The results of this research project will be presented at the Symposium entitled “Culture of Prevention on OSH” at the XXI World Congress on Safety and Health at Work in Singapore.

What is the basis for KOSHA’s work?

The work of KOSHA is based on human respect in the form of ‘Hongikingan’. This is the national founding principle of Korea and means ‘We benefit people all around the world.’

In addition, it is based on competence, communication and cooperation.

How does KOSHA support the building and maintaining of a national preventative safety culture?

Based on the Hongikingan principle, KOSHA promotes “Safety First” and a long-term safety and health culture for the benefit not only of workers but also of the general public. Safety is the foundation of our lives. It is an essential requirement during our lives to nurture our dreams and find fulfilment.

The promotion of a safety and health culture is one of the four strategies of KOSHA for achieving KOSHA’s vision of being a “Happy Partner of Workers, Top Leader in Occupational Accident Prevention”. This strategy covers three tasks. First: Raising the level of a pan-national safety culture. Second: Delivering high-

quality OSH training. Third: Building and reinforcing networks of OSH cooperation.

Raising the level of a pan-national safety culture: To enhance safety awareness among employees and employers, and to help safety culture take root in Korean society as a whole, KOSHA conducts PR campaign activities and safety culture campaigns using various media sources.

Since 1995, the Korean government has conducted nation-wide safety culture campaigns jointly with public and private organizations, in order to spread the importance of safety in people’s daily lives.

One of the representative safety culture campaigns in Korea was the “10 million signatures campaign for zero accidents.” It formed a social consensus on safety and health and motivated the whole general public to unite in participating in a safety culture.

In 1996, the Committee for Safety Culture Campaigns has designated the 4th day of every month as “Safety Check Day” to encourage the general public’s participation in activities related to safety. Designation of the day was aimed at helping people to identify hazards on their own and adopt safe habits in their daily lives.

In addition to commemorating “Safety Check Day,” KOSHA develops and implements a variety of activities related to safety culture, meeting the needs of different local areas. Furthermore, in partnership with NGOs, trade unions and industrial consultation bodies, KOSHA carries out many activities to heighten the

**The work of
KOSHA is
based on Human
Respect.**



public's safety awareness and expand the scope of safety-related movements to wider communities.

Based on the provision stipulated in Korea's OSH Act, KOSHA and the Ministry of Employment and Labor have designated the first week of July as the "National Week for Safety and Health" and carry out safety-related campaigns and activities. Designation of the week is in recognition of those who have contributed to workers' safety and health,

trade union leaders. The event has so far contributed to building a safety culture across the nation, raising the value of safety as the utmost priority.

Delivering high-quality OSH training: The development of safety awareness usually starts at home, progresses through school education, culminating in workplace safety training. Safety training for children and students through the pre-school, elementary, middle, and high school education system is therefore

to value safety through their adult lives and to participate actively in prevention efforts. KOSHA's early intervention programme on safety includes: research into the OSH curriculum in schools, safety and health training for teachers, provision of safety education in schools as a pilot project, and development of training materials for education in schools.

Building and reinforcing networks of OSH cooperation: In 2016, KOSHA was engaged in technical cooperation with 54 international professional organizations in 28 countries. At the same time, KOSHA was active in an international network of professional organizations.

In addition, KOSHA works together with international organizations such as the ILO, WHO, EU-OSHA and ASEAN-OSHNET in order to play an important role as demanded by the international community.

As a responsible member of the OECD, the Korean government and KOSHA continue to implement technical support programmes for developing countries to assist their accident prevention efforts.

Furthermore, as a leading OSH organization in the Asian region, KOSHA leads the way in enhancing the level of OSH by collaborating with government bodies and public organizations in the region.

A safety culture at the centre of daily life. What does that mean?

The life goal of human beings is the pursuit of happiness. The

pursuit of happiness involves several essential factors, such as good relationships with other people and a job which is worthwhile. Above all, a healthy mind and body protected from possible accidents in daily life should be a prerequisite. For this, a safety culture which puts safety first must take root in social activities.

A safety culture, long neglected and long overdue, must now take centre stage in our society. To this end, KOSHA runs ongoing safety culture campaigns such as the Zero-Accident Workplace.

The first week of every July is devoted to OSH: in 2017 the Korean National Week for Safety and Health will mark its 50th anniversary. The year 2017 is also important for KOSHA as it is the 30th year since its foundation. In addition, KOSHA conveys the message of safety and health through various broadcasting media, publications, outdoor advertising, online etc. KOSHA has also explored different genres of culture such as safety games and a play.

For almost 30 years, KOSHA has invested its utmost efforts in protecting the life and health of working people and ensuring comforts and happiness throughout the lives of the general public. From your perspective, what are the biggest challenges we face?

The world of work is becoming increasingly complex and diverse. The main challenge for all of us is how to keep our OSH policies relevant in the fast-changing circumstances of the world, for

example in the face of emerging hazards such as hazardous chemicals and industrial disasters.

In a volatile, uncertain, complex and ambiguous world of work (VUCA-world) we are increasingly confronted with new and emerging risk factors such as psychosocial risks (linked in some cases to physical risks such as musculoskeletal disorders). How does KOSHA's concept of a safety culture deal with these kinds of risks? KOSHA works closely with companies handling hazardous chemicals and provides them with professional skills to prevent occupational illnesses. We are enhancing the level of workers' health promotion by adopting a business health index and providing consultations.

For workers with higher risks of suffering from "emotional labour", we create and provide occupational health guidelines and consultations.

KOSHA promotes the health of working individuals through professional consulting and financial support. For those who work in small businesses, in particular, 20 health centres have been established around the country.

The promotion of a safety and health culture by KOSHA seems to be focused very much on the individual. By what means does KOSHA address the organizational level, e.g. in businesses, administrations and educational establishments?

We enhance safety and health training programmes by provid-

ing learner-customized training and specialized curricula, and by opening more hands-on OSH training centres.

We also enhance practicality by providing experience-based training programmes through virtual reality, developing OSH materials using new media such as KOSHA applications, and strengthening the OSH media supply chain.

Our efforts are also focused on developing a cooperative system for OSH by organizing safety and health leader groups for major industries, such as the shipbuilding, construction, steel, automotive and chemical industries, organizing regional OSH committees, and holding public safety and health competitions. In addition, needs-based training is tailored for example to the needs of certain vulnerable groups.

For you as a chemical engineer, what is the difference between a "safety culture" and a "culture of prevention"?

The first difference between a "safety culture" and a "culture of prevention" is one of terminology. The core value of OSH is currently shifting from safety to prevention. Safety culture is static and reactive, while prevention culture is more dynamic, proactive, and preventative. Based on this concept, one of the strategies of KOSHA at a national level is to promote a preventative safety and health culture. A good preventative safety and health culture at national level is to lead to a worldwide culture of prevention. ●



and aims to build a nation-wide consensus through the exchange of related technologies and information.

As the largest OSH event, the National Week for Safety and Health is gaining increasing numbers of participants not only from among safety and health professionals, but also from among the general public, including civic groups, teachers, students, and

critical, as safety input during childhood has a lasting effect throughout adult life and helps to form a person's attitude toward safety. Against this backdrop, KOSHA supports safety training by training the teachers.

This goes a long way towards preventing safety accidents in schools and informing students of the importance of safety. Such early intervention helps students

“KOMMMITMENSCH” A CAMPAIGN TO ESTABLISH A CULTURE OF PREVENTION

“kommmitsch” is a long-term campaign to establish a culture of prevention, and will be launched at the A+A trade fair on 18 October 2017. The German name of the campaign is a play on words: it can be translated loosely as “hey, come with us”, whilst also playing on the English word “commitment”.

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Web link Detailed concept document
and explanatory film on the campaign:
www.dguv.de, Webcode: e1070162

Considerable progress has already been made in the prevention of occupational accidents and work-related health hazards.

A review of the statistics from the last 100 years shows that occupational and commuting accidents have decreased strongly. The statistics also show however that the drop has slowed considerably in more recent years. Are the prevention strategies pursued to date perhaps not adequate for realization of Vision Zero – a world without fatal or severe occupational and commuting accidents and occupational diseases? Changes at the workplace associated with Work 4.0 in particular demonstrate that a greater need for action exists in order to bring about a change in thinking with regard to safety and health. A slowing in the reduction of the accident rate is something that we are not willing to accept. How then can we address this problem?

AN UNDERSTANDING OF PREVENTION

In the new prevention campaign, the German Social Accident Insurance Institutions will provide companies and institutions with greater support in developing a new, comprehensive understanding of prevention. Companies' preventive activity is particularly successful when it integrates safety and health aspects systematically on all levels of decision-making and action. With its holistic approach, the campaign presents safety and health as values to be adopted for all individuals, organizations, and society as a whole. Shared values lead to a common understanding, a common culture – in this case, a “culture of prevention”. Safety and health thus become

the yardstick for all action. Our hope is that this will have a new and greater effect upon the drop in the accident rate.

The campaign is to be launched on 18 October 2017 at the A+A-Congress in Düsseldorf. Since cultural change cannot be brought about in a short space of time, a ten-year term has been set for the campaign. The DGUV will provide the common communication concept, including press work, media and training measures, within an umbrella campaign. In the campaigns run by the individual accident insurance institutions, specific sectors and groups will be targeted strategically. The intention here is for all persons to be reached directly within their own environments.

komm **mit** mensch

Safe. Healthy. Together

The slogan of the new campaign is “kommmitsch – Safe. Healthy. Together.” It attracts the viewer's attention and piques their curiosity, and the direct form of address motivates and involves him or her. The slogan can be understood in a number of different ways, communicating the concept in a sustainable and exciting way. It is also gender-neutral, and is suitable for use as an umbrella brand. By creating a community of people who identify with the slogan, much can be achieved, in social media and beyond.

A BASIS FOR THE CONTENT: THE DETAILED CONCEPT DOCUMENT

The content of the campaign is based upon a detailed concept document. During drafting of this document, six issues were identified as having a particular influence upon a culture of prevention in organizations. The issues are closely linked to each other.

PREVENTION AS AN INTEGRAL PART OF ALL TASKS

If safety and health are to be made an integral part of all decisions and actions, the existing situation in a given company must be determined, and needs for change identified. This requires a systematic process. The issue of “Integration of prevention in all company tasks” is concerned with setting such a process in motion and pursuing it continually.

ROLE OF MANAGEMENT

Safety and health can be enshrined in company operations only if company management makes a clear commitment to it, and only if all employees are aware that their commitment to this issue will be valued. The management of a company must therefore enshrine safety and health as a key target within its activities, and also make strategic efforts to motivate employees to be watchful and active in this area.

COMMUNICATION

Good communication within companies is also of great importance for safety and health. This includes providing information and feedback, expressing appreciation, discussing shared values, and avoiding misunderstandings. Close discussion, through both formal and informal channels, ensures openness, transparency and appreciation. The flow of information within a company guarantees that information relevant to safety and health is available, and is ultimately also essential for discussion of shared values.

PARTICIPATION

The enthusiastic involvement of workers in safety and health measures yields a double benefit. Firstly, the expertise of the workers, who are the ones most familiar with their workplaces, is exploited; secondly, their willingness is increased to make efforts in the interests of safety and health. Involving workers in



company decisions signals that they are held in esteem and increases their motivation to work towards greater safety and health within the company. Opportunities for involvement are presented for example by surveys of the employees, a company suggestions scheme, or working groups on safety and health.

NO-BLAME CULTURE

Change is always dependent upon a constructive approach to

▲ ►
Delegates at the 2017 Dresden Prevention Forum have already had the opportunity to promote the “kommmitsch” campaign.





WORK ATMOSPHERE

A positive work atmosphere has a decisive influence upon worker performance, loyalty to the organization, and worker health. It is characterized by a strong feeling of shared identity, good communication, collegiality, mutual support, esteem, fairness and justice. A good work atmosphere also ensures that management personnel and workers alike identify with the company and with its values, standards, attitudes and modes of behaviour, and adopt them in their own action. It can be influenced positively for example by good leadership and communication, active commitment to diversity and fairness, joint activities, and rules for cooperation that are actually followed in the company.



PREPARATIONS FOR THE CAMPAIGN

KulturCheck: Before the prevention campaign is rolled out in companies and the planned measures implemented in them, it is advantageous for a status check to be performed in the companies. This applied in the same way to the DGUV: analysis and further development of its own culture of prevention is important if the content of the campaign is to be communicated credibly. A number of options exist for analysis, for example discussion-based methods or consulting. As part of the campaign, a discussion and partici-

pation-based tool was developed that is intended above all to assist micro enterprises and small and medium-sized enterprises in ascertaining their instantaneous status of prevention.

In order to determine the present situation and launch the process of change at the DGUV, the IAG has developed an analysis tool named KulturCheck. This tool provides a company or institution with a snapshot of the existing prevention culture within its own organization, delivers feedback on the status quo at the level of the individual issues, and reveals strategies for change. It can be used to identify suitable measures. A process of regular reflection upon the value of safety and health can thereby be launched.

The main components of KulturCheck are a structural check ("StrukturCheck") and a standardized questionnaire for the workers. StrukturCheck surveys information on the organization; the standardized questionnaire records the workers' view. Performance of KulturCheck is optional for the individual German Social Accident Insurance Institutions. The DGUV (i.e. the umbrella association) applied KulturCheck at the end of 2016. Of 1,156 employees, 563 took part in the voluntary, anonymous survey. This equates to a response rate of 48.7% – a very high figure for a survey of this kind. The measures defined based upon the results are now being launched successively.

decisions and actions that have resulted in error, (near) accidents, or at the very least health hazards for workers. Where a company or an institution has a constructive no-blame culture, it is natural for workers to discuss such events with their superiors or managers, and to seek good solutions together. A constructive approach to errors must be valued and deliberately fostered if safety and health are to acquire a high status in the company or institution.

With its holistic approach, the campaign presents safety and health as values to be adopted for all individuals, organizations, and society as a whole.

INTERNAL CAMPAIGN

In order for the content of the campaign to be communicated properly, the goal was formulated beforehand that all aspirations and values were also to be put into practice from the outset at the DGUV and its member institutions. We will not be able to generate enthusiasm in others for the subject of a prevention culture and convince them of its importance unless we have made "kommitmen and women" of our own employees.

The campaign was therefore preceded by an internal campaign before its official launch on 18 October 2017 at the A+A. All employees of the German Social Accident Insurance, around 20,000 persons, were informed of the campaign's content and targets. Their "kommitment" to the campaign was therefore sought. The internal campaign also enabled the efficacy of communications measures to be tested on the internal target group.

TRAINING

A custom training concept also exists for the new campaign, developed for all employees of the accident insurance institutions tasked with implementing the campaign in companies and institutions. The starting-point for this concept was that the training does not merely represent an instrument for performance of the campaign, but that learning also constitutes an integral component of cultural change. The

detailed concept document of the campaign formed the basis of the training concept. Modules of the training concept for the prevention campaign:

- Workshops for persons at the German Social Accident Insurance Institutions with responsibility for the campaign
- Recommendations for action, geared to the target groups
- From 2018 onwards, specialist seminars/modules on the individual issues addressed by the detailed concept document
- E-learning provision (such as a webinar) for expansion of the content



PROCESSES OF CHANGE

Recommendations for action, targeted at specific groups, were produced for the campaign. They detail how the value attached to





to be made. These approaches are suitable for integration into existing processes, and can generally be implemented with existing resources.

The objective is to equip companies and institutions to develop their culture of prevention further themselves. The individual accident insurance institutions develop sector-specific support resources of their own for this purpose.

Companies and institutions can follow the classic PDCA procedure (plan-do-control-act):

- Plan: Agree a target vision.
- Do: Check how this vision is developed on the levels of the individual issues, and what steps could be beneficial. It may be sufficient to begin with a single issue. Links to other issues will often arise as a matter of course.
- Control: Check the success of the steps.
- Act: Agree the subsequent procedure.



safety and health within companies and institutions can be changed. The guidance documents are continually being extended. They provide arguments for addressing the topic, and convey the idea that the concept is not something completely new, but rather a further step towards a safe and healthy company or institution. The guidance documents describe how companies and institutions can launch a discussion of values, and from this discussion, identify changes

The recommendations for action provide approaches for dealing with each of these aspects. The campaign website and the e-learning resource provide instruments and tools for the analysis and design of measures. The guidance documents and all other instruments and tools are available to the individual accident insurance institutions for use as a basis for strategies and media of their own.

An important aspect is that cultural change has no end point.

Companies and institutions are continually developing further, and the same applies to the culture of prevention. The workers should be involved continually. Existing structures, such as meetings of the OSH committee, the provision of instruction, team meetings or staff meetings can be used for this purpose, particularly in small and medium-sized companies.

Ultimately however, every company must find its own solution. The campaign has set itself the goal of providing continual stimulus and assistance in order for as many companies and institutions as possible to discover the culture of prevention as an important topic for themselves.

HOW WILL THE EXTERNAL CAMPAIGN BE LAUNCHED?

From the launch of the campaign onwards, the schedule makes provision for focussing upon the different issues in waves. In the various issues, communication and all measures will then be adapted to the specific target groups and sectors. The success of this approach will be evaluated in the fourth campaign year.

Since management personnel play a vital role in their companies and are able to influence the work atmosphere, the use of guidance documents and implementation of the measures, communication will begin on the management level. Through this approach, we aim to encourage involvement in the topic of a prevention culture. ●

GERMAN OSH PRIZE 2017

Who has the best ideas for safety and health? The DGUV and its partners are to award the German OSH Prize for the fifth time.

The world of work is changing faster than ever before: with continual progress, breathtakingly fast production, and rising demands. Occupational safety and health is crucially important in order for everyday working life to remain safe and healthy despite these changes. Every two years, the German OSH Prize is awarded to companies that have made particular efforts to safeguard the safety and health of their employees. Clever concepts and processes or new types of product and technology are called for. Measures that effectively improve occupational safety and health in German companies, and inspire others to emulate them.

In 2017, the German OSH Prize will be presented for the fifth time. The award is made by the BMAS, the LASI and the DGUV. The prizewinners each receive €10,000 with which to extend their occupational safety measures.

Awards are made in four categories:

- Small and medium-sized enterprises
- Large enterprises
- Technical solutions
- Organizational solutions

The applications are considered by a number of expert committees during the decision-making process. Short-listed companies are visited, enabling the innovative ideas to be assessed on-site. Finally, a panel of high-ranking, independent experts from the commercial sector, government, industry associations and the research community assesses all the applications and decides which are to be nominated and to receive an award. ●

Contact Competition office: Deutscher Arbeitsschutzpreis, Düsseldorf, info@deutscher-arbeitsschutzpreis.de
Web link All prizewinners and conditions for entry: www.deutscher-arbeitsschutzpreis.de

The winners of the German OSH Prize 2017 will be announced at the A+A trade fair in Düsseldorf traditionally. ▼

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In 2017, the German OSH Prize will be presented the fifth time. The award is made by the BMAS, the LASI and the DGUV.

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THE SECTORAL RULE PREVENTION INSTRUMENT

The Sectoral Rule is a new form of DGUV Rule. It takes the form of a clearly structured compendium and provides all the essential information on occupational safety and health within a sector.

In Germany, the task of preventing occupational accidents, occupational diseases and work-related health hazards is assumed by the state and the German Social Accident Insurance Institutions in a dual system. This double assumption of tasks is one reason for the high standards of protection assured by German OSH legislation. At the same time however, the legislation is complex and extensive. Rather than containing concrete and detailed protective measures, the majority of OSH regulations formulate abstract obligations for procedures and organization.

COMPENDIUM

This deficit is addressed by the prevention instrument of the Sectoral Rule. Sectoral Rules constitute a complete resource with the aim of providing everything needed at a glance. They take the form

of clearly structured compendiums, providing all the essential information for occupational safety and health within a specific sector. They not only describe specific hazard situations, but also present practicable suggestions for solutions. Sectoral Rules do not constitute new legislation, but are a roadmap for solutions by which the existing statutory

requirements can be met. The Sectoral Rules are addressed in the first instance to employers in small and medium-sized enterprises. At the same time, they provide assistance for occupational physicians, OSH professionals and safety delegates.

STRUCTURE

Sectoral Rules adhere to a harmonized structure. A brief introduction presents the content and objectives of the Sectoral Rules. The following chapter presents the principles for occupational safety and health in a concise form. To facilitate orientation, this chapter is divided into a general and a sector-specific section. The third chapter forms the heart of each Sectoral Rule. This chapter covers all workplaces and tasks within the sector concerned. Each workplace and the associated tasks are identified on a double page, on which measures for safety and health at work are also presented. On the double pages, colour-coded information boxes show at a glance the relevant underlying legal texts and further information. Finally, the new DGUV Sectoral Rules contain an annex and an index of key terms, enabling particular hazards, workplaces, tasks, working methods and occupational safety and health measures to be located more easily.

LANGUAGE

Legal texts and standards are not quoted verbatim in the Sectoral Rules. The OSH duties arising from these legal texts are presented clearly, concisely and illustratively, and in language geared to the target readership, with reference to the specific task or workplace. The direct mode of address to readers of the Sectoral Rules arouses their interest. Active sentences are used rather than long passive constructions to explain the measures and duties clearly. Images with examples of good practice and easily remembered symbols in the individual sections make it easier to find the right measure,

even in the heat of the moment at work. Gender-inclusive language is observed in the Sectoral Rules, ensuring that female employers and employees feel as included as their male counterparts.

DRAFTING



The experts of the German Social Accident Insurance Institutions are organized under the umbrella of the DGUV in 15 expert committees and almost 100 subcommittees. The core task of the expert committees is to formulate a uniform and validated expert opinion on prevention topics that is binding upon all of the accident insurance institutions, and to publish it in documents such as the Sectoral Rules. Employers' and employees' associations, the German

PUBLICATION

In March 2016, the DGUV's Raw materials and chemical industry expert committee published the first Sectoral Rule: DGUV Rule 113-601, for the mineral raw materials extraction and processing sector. Two further DGUV rules concerning the waste management industry, Parts I and II, were included in the DGUV's database of publications at the end of 2016: DGUV Rule 114-601, on waste collection, and DGUV Rule 114-602, on waste processing.

Further Sectoral Rules that have been published:

- Temporary agency work: requirements for temporary work agencies and the companies at which temporary agency labour is employed
- Call centres


Sectoral Rules take the form of clearly structured compendiums, providing all the essential information for occupational safety and health within a specific sector.


national and regional governments, and selected experts in the safety and health of workers at work are represented on the expert committees.

EVALUATION

In the course of development of the Sectoral Rules, the subcommittees also evaluate the DGUV's existing body of rules and regulations. They retain arrangements that are worth preserving, and where possible rescind obsolete accident prevention regulations. Rules and information that no longer constitute good technical, occupational medical or occupational health practice are withdrawn.

Altogether, almost 40 projects for Sectoral Rules have been approved by the DGUV's prevention principles committee (GAP) based upon a project description submitted by the expert committee or subcommittee responsible. These include Sectoral Rules for schools, office-based operations, bakeries, buildings cleaning services and civil engineering. The next objective for the DGUV's expert committees and subcommittees is to make the Sectoral Rules available in the form of apps for tablets and smartphones. ●

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Web link Information on SectoralRules
www.dguv.de, Webcode: dp126848
Sectoral Rules for the waste
management sector www.dguv.de,
Webcode: dp1040224

ASSISTANCE WITH INTEGRATION

The German Social Accident Insurance provides a range of target groups with useful information on the integration of refugees on the labour market.

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Web link Internet resource containing information from the German Social Accident Insurance on the subject of refugees: www.dguv.de,
Webcode: d1151666

The German Social Accident Insurance is concerned with aspects of safety and health in many areas of life: at work, in schools and

INITIAL INFORMATION

In 2015 and 2016, the German Social Accident Insurance faced a number of questions particularly concerning the safety and health requirements in refugees' reception centres, such as fire safety information and the insurance of volunteer helpers. Teachers and childcare professionals also require support in dealing with child refugees.

INTERNET PORTAL

In the light of this situation, the DGVU has coordinated the formation of a network, involving parties such as chambers of commerce, guilds, educational establishments, state OSH authorities, the social partners, the German Road Safety Council, and the "The Safe House" campaign. A working group has been formed that has examined and compiled existing material and supplemented it with further, new information. The collection of material has been uploaded to the DGVU's

Internet portal providing information on the subject of refugees.

This portal is a source of useful information and links for the following target groups:

- Volunteers
- Local authorities
- Schools and children's daycare facilities
- Companies

The information is continually being extended. It is geared to the range of prevention services delivered by the accident insurance institutions.

In order for refugees to be placed as quickly as possible in employment as part of their social integration, the website provides companies, in particular, with guidance in the area of occupational safety and health. Guides to the provision of instruction, posters and leaflets, in some cases in the refugees' native languages, are for example available for download. ●

Refugees should be integrated on the labour market, and children in schools and daycare facilities, as quickly as possible. As employees and students, they then enjoy the protection of the German Social Accident Insurance – as do their German helpers. ▶

children's daycare facilities, and in voluntary service. This responsibility includes the challenge to society of providing support in the integration of refugees. In local authorities, volunteer bodies, educational establishments and companies, many people are on hand to assist refugees and are making efforts to help them to integrate.

PREVENTING ADDICTION IN THE WORLD OF WORK

Preventive measures at the workplace enable safety and health risks arising from the abuse of addictive substances to be reduced effectively and sustainably.

Addiction is a problem that must be taken seriously in the worlds of work and education. The abuse of addictive substances and forms of addiction that are not substance-related affect all strata of society, sectors, parts of companies and hierarchical levels. Addiction is therefore a constant topic in workplace prevention activity.

RISK ASSESSMENT

Risk assessments are an important instrument for preventing and combating the abuse of addictive substances in an occupational context. They include the identification of work conditions that contribute to addiction, for example by causing mental strain. Risk assessments and the resulting measures should also consider aspects for health promotion, since the latter constitute valuable social resources for workers.

NEED FOR ACTION

The general principle in accident insurance that prevention takes priority over rehabilitation applies equally in addiction prevention. The importance of this can be seen from the possible consequences of addictive substance abuse. In their daily

work, affected workers place other persons in danger besides themselves. It is irrelevant in this context whether the substance is a legal or illegal drug; a need for action exists in either case.

SUPPORT

The German Social Accident Insurance Institutions support companies in addiction prevention. A survey conducted in 2015 showed that information, communication, consulting and training are important elements in the prevention of addiction, and that the topic is growing in importance. A project group in the Workplace health promotion subcommittee is currently drawing up a guidance document on the subject of addiction prevention. The document is intended for small and medium-sized companies.

STATUS

Preventive activity, including the prevention of addiction, is supported in Germany by legislation. This includes the German Prevention Act (PrävG), adopted in 2015. The act requires statutory health, accident, pensions and nursing care insurance to concentrate their resources more strongly and to develop common

targets. With its aim of bringing about changes in all living environments in the interest of good health, the act accords a high status to preventive activity. In the area of addiction prevention, the legislators turned their attention above all to risk factors such as smoking and alcohol consumption.

Preventing the consumption of addictive substances is placed in the context of the new developments in the world of work, frequently summarized under the heading "Work 4.0". Besides the positive aspects of these developments, they also present risks to workers, such as overload and underload (burnout and boreout). These trends should therefore be considered in addiction prevention.

In the long term, the safety and health risks arising at work through the consumption of addictive substances can be reduced only by measures for prevention and intervention. It is never too early to provide support. ●

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Web link Resources for addiction prevention intended for different target groups: www.dguv.de ▶ Prävention ▶ Themen von A-Z ▶ Suchtprävention



A PILLAR OF SOCIAL SECURITY IN EUROPE?

The European Commission is drawing up a “European Pillar of Social Rights”. The DGVU sets out its position.

In March 2016, the European Commission published a communication entitled “Launching a consultation on a European Pillar of Social Rights”. At the beginning of 2017, the DGVU took part in the consultation by issuing a statement of its own and contributing to a further statement by the other social insurance institutions. The latter statement was agreed at the Representation of the German social insurance system at the EU in Brussels.

REFERENCE FRAMEWORK

Lying as it does within their competence regarding the structuring of social security, the European

Pillar of Social Rights is an issue for the Member States. The European Commission intends it to be a supplementary instrument

that defines common principles within the field of social affairs. This instrument is to serve as:

- The reference framework for screening of the employment and social performance of participating Member States
- A motor driving social reforms at national level
- A compass for the desired process of convergence of labour markets and social systems in the Eurozone

CONSULTATION

The consultation relates to general aspects, for example the social situation, the most pressing priorities in employment and social affairs, the future of work and of the welfare systems, and specifically, to the concept of the “European Pillar”. The preliminary outline of the European Pillar of Social Rights also devotes a section to occupational safety and health, under the heading “Fair working conditions”. In addition, concrete questions are raised concerning a number of topics, including the significance of European initiatives in the field of occupational safety and health, healthcare, retirement

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Web link Response of the DGVU to the consultation by the European Commission www.dguv.de, Webcode: e1067290

➤

The objective is to reduce the administrative overhead whilst at the same time assuring protection for workers.

➤

pensions, integrated social benefits and social services, disability benefits, and nursing care. The results of the consultation can feed into EU legislation, in order for European arrangements to be brought up to date.

The DGVU welcomes the efforts of the European Commission to reinforce the social dimension within the European Single Market. However, the pre-eminent significance of the rights of Member States in the sphere of social security must be preserved in this process. The DGVU’s statement emphasizes that it rejects a further transfer of competencies to the EU in the field of occupational safety and health. A lowering of standards, whether in occupational safety and health or in the quality of benefits, is also to be avoided. In the view of the German Social Accident Insurance, topical challenges such as demographic change, digitalization and new forms of work can best be tackled by the national social systems themselves. The DGVU supplements its statement with good-practice examples from the fields of prevention and benefits.

EVALUATION

In 2017, it is appropriate once again to direct attention to the activities of the EU in the area of occupational safety and health. Parallel to consultation regarding the pillars, the European Commission

has launched an evaluation of the 89/391 EEC framework directive and the 23 associated occupational safety and health directives. The evaluation is to consider their relevance, effectiveness and coherence.

INITIATIVE

At the beginning of January 2017, the European Commission announced a new initiative to improve the safety and health of employees: “Safer and Healthier Work for All – Modernisation of the EU Occupational Safety and Health Legislation and Policy”. With explicit reference to the “European Pillar of Social Rights” and through “key actions”, the European Commission aims to provide support for small and medium-sized enterprises in particular in their observance of the European regulations governing occupational safety and health.

Furthermore, the existing European OSH legislation, particularly the 23 directives, is to be reviewed for its fitness for purpose. Obsolete regulations are to be withdrawn within two years, or are to be updated, particularly in consideration of the risks and challenges presented by a changing world of work. The objective is to reduce the administrative overhead whilst at the same time assuring protection for workers. This initiative will also be monitored closely and critically by the DGVU. ●

NEW STIMULI

The German Prevention Act (PrävG) is based upon networking of the various players in the different issues. The first Prevention Forum in Berlin provided opportunity for such networking – a dialogue that will be used to update the national Prevention Strategy.

The core concern of the PrävG is to step up preventive measures and promotion of good health in human living environments. Living environments are not only companies and the community, but also schools, children's day-care facilities and nursing homes. Essential stimuli are provided by a range of new arrangements.

The first Prevention Forum, held in Berlin in September 2016 by the BVPG (Federal Association for Prevention and Health Promotion in Germany), was intended to establish dialogue with the specialist public.

Drawn as they were from national professional and umbrella organizations, the delegates covered the target groups of the federal framework recommendations.

At the Prevention Forum, the delegates had the opportunity to network and were able to present their perspectives to the discussion process of the NPK. Different areas of responsibility were brought together, and discussion between different disciplines and professions was facilitated.

At the launch session of the event, Ingrid Fischbach, Parliamentary State Secretary at the German Federal Ministry of Health (BMG), explained the concerns and objectives of the PrävG. She focussed upon the responsibility of the different facilities and institutions and their statutory mandates. Professor Dr Thomas Kliche from the Magdeburg-Stendal University of Applied Sciences described the key challenges facing prevention and health promotion activity for living environments: quality assurance, knowledge transfer and cost-effectiveness. Summarizing

PREVENTION FORUM

The first Prevention Forum thus served primarily as a platform for the pooling of information and experience between the NPK and the wider specialist public. Held annually, the Prevention Forum is to involve relevant players from government, professional organizations and civil society in the discussion process of the NPK. The focus consequently lay upon the objectives and issues of the NPK for implementation of the national Prevention Strategy, which are set out in the federal framework recommendations. In accordance with these recommendations, they are geared to life phases:

- “Growing up in good health”
- “Living and working in good health”
- “Good health in old age”

Their overriding objective is cooperation between the social insurance institutions: commitment to preventive activity and the promotion of good health should be geared to common targets and issues. This naturally includes the objectives of the Joint German OSH Strategy (GDA).

In order for a joint prevention strategy to be developed, the umbrella associations of the German health, retirement pensions, accident and social nursing care insurance institutions have been tasked with forming a National Prevention Conference (NPK).

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how these challenges can be faced collectively, he made the case that the necessary participatory technical and policy control – in short, governance – involves learning processes for all involved parties, and that they are therefore in for the long haul. During the subsequent panel discussion, the social insurance institutions, represented by Dr Walter Eichendorff (DGUV), Gundula Roszbach (DRV-Bund), Gernot Kiefer (GKV-SV) and Leo Blum (SVLFG), explained their strategies for prevention in living environments and companies. They thereby underlined their willingness to work both together and with third parties. The representatives from living environments and companies taking part in the panel discussion emphasized the importance of keeping the prevention concept in mind from cradle to grave.

WORKSHOPS

In the afternoon workshops, the delegates contributed their perspectives to the key topic of cooperation and opportunities for networking. The workshops were geared to the target groups defined in the federal framework recommendations, including “expectant families and children”, “schoolchildren, apprentices and students”, “economically active people and volunteers”, “unemployed people”, “people in the community following



At the German Social Accident Insurance, we particularly contribute to the prevention strategy in the living environments of education and work. The strategy of gearing targets and issues to phases of the life cycle fits seamlessly into our own prevention campaign, beginning in 2017, the objective of which is to create a comprehensive culture of prevention.



retirement”, and “residents of care facilities”. The workshops demonstrated clearly once again how fruitful the approaches are for discussions and joint activities.

LEARNING PROCESS

The first Prevention Forum was part of the launch of a joint learning process with the goal of preventive activity and health promotion for society as a whole. The results of the forum are being discussed in the NPK and feed into further development of the federal framework recommendations.

For the DGUV as a constituent body of both the national Prevention Strategy and the GDA, dialogue between the Prevention Forum and the OSH Forum in the preventive activity of “working in good health” is of great importance. Cooperation between

the two fora could contribute further to preventive activity and health promotion being considered from all perspectives at company level. This would be one means of intermeshing occupational safety and workplace health promotion even more effectively. This opportunity is to be exploited to the full in the next Prevention Forum. ●

Second Prevention Forum (2017), focus: “health promotion in the community”

Third Prevention Forum (2018), provisional focus: “workplace health promotion and preventive activity”, and the GDA term beginning in 2019



Workshop with Mongolian OSH experts (left)

Fire safety exercise with representatives from the Bangladeshi textile sector (right)

“KNOW” WITHOUT “HOW” IS POINTLESS

▲ Planning workshop with Pakistani experts.

Through their involvement in training at international level, the DGUV and other bearers of knowledge exchange their experiences with other countries.

What use is more than 125 years of experience if it isn't shared? The DGUV and the Institute for Work and Health (IAG) have followed this philosophy for

over ten years through international seminars. They were supported in 2016 by the BMZ, the GIZ, the ISSA and

the BG ETEM. As a result, over 100 delegates from Bangladesh, Pakistan and Mongolia were able to receive further training.

The content of the international seminars encompasses:

- Prevention
- Occupational accident insurance
- Rehabilitation
- Organizational structures

The DGUV's international activities are backed not only by their mandate from the social partners, but also by the Vision Zero strategy, which fosters good work worldwide.

PAKISTAN

Staff from the IAG and the BG ETEM have supported a study

in Pakistan determining the return on prevention (RoP) for the Pakistani textile industry. The study was based in turn upon the results of the study for calculation of the international return on prevention, which was conducted up to 2010 by the DGUV in conjunction with the ISSA. The RoP quantifies the financial benefit of an investment in occupational safety and health (OSH). It delivers convincing arguments to companies and government authorities for the financial viability of OSH measures. In a three-day workshop held in Lahore, par-

ticipants developed guidelines for structured interviews, and prepared the interview process and analysis of the results. The results are available in the form of a report.

MONGOLIA

The experience gained by the DGUV and the BG RCI is also of interest to those responsible at the Mongolian OSH institutions for the mining sector. The IAG has held two seminars for this target group on behalf of the GIZ. One of these focused upon typical health risks for mining workers, the other on the training of labour inspectors and on OSH campaigns. One result of the first seminar is the establishment

of an OSH training institute in Mongolia, which is comparable to the IAG. Further joint seminars are planned for 2017.

BANGLADESH

The first tripartite study programme for Bangladesh, held in 2015 with the involvement of the social partners, resulted in an accident insurance system being planned for the Bangladeshi textile sector. The success of the programme led to two further programmes being held the following year. During the events, each of which ran for three weeks, delegations from Bangladesh visited the IAG in Dresden, the BG ETEM's training centre in Bad Münstereifel, the DGUV in

Berlin, the BMZ and the BMAS. The programme was attended by representatives of employees, employers, and the state occupational safety and health authority in Bangladesh. In practical exercises and workshops, they developed ideas and concepts for social dialogue, safety at work, and accident insurance. The resulting proposals consider the interests of all parties involved. In the medium term, they would enable the underlying conditions to be adapted to the rapid economic and technical developments in the country, and minimum standards to be established for training of middle management in occupational safety and health. ●



WORKING IN THE SUN

Outdoor-workers are at risk of natural ultraviolet radiation causing harm to their skin.

The risk of contracting skin cancer can be lowered by the systematic use of protective measures. In the future, task-specific exposure values will assist in the quantification of worker exposure, promotion of prevention activity, and performance of assessments in suspected cases of occupational disease.

Employees in the construction sector and in road-building, public swimming baths, agriculture and shipping are exposed to natural ultraviolet (UV) radiation by virtue of their occupations. Many years of employment in these occupations put them at a greater risk of contracting basal-cell and

squamous-cell carcinomas than the population as a whole. Since 1 January 2015, squamous-cell carcinomas of the skin and multiple actinic keratoses of the skin may be recognized in Germany as cases of occupational disease BK No 5103, provided certain criteria are met.

Long-term harm caused by UV radiation does not generally arise until it is generally already too late for a cure. Systematic prevention activity in which all are involved – employers and employees – is therefore all the more important. In conjunction with the individual German Social Accident Insurance

Institutions, the DGUV is working on assessing the hazard on the basis of the duration of exposure and intensity of the solar radiation, and developing protective measures based upon the results. The DGUV has a coordinating role in numerous activities ranging from research projects, through the drafting of guidance documents, to work on expert committees.

POSITION PAPER

The framework for action by the accident insurance institutions is described by a position paper on the prevention of health hazards caused by exposure to solar radiation. The aim is to define uniform standards for protection against such exposure. The form of implementation may however differ from sector to sector.

RESEARCH

Some 2 to 3 million employees in Germany are assumed to spend over 75% of their working hours outdoors. This is an arbitrary figure, since considerable exposure may occur even within a shorter space of time. The DGUV has already developed a method for estimating the personal UV exposure of employees retrospectively. Up-to-date measurements will enable risk groups to be identified. In one such research project, UV radiation exposure during occupational activities is recorded by means of the new GENESIS-UV (GENeration and Extraction System for Individual expoSure) measurement system. The focus lies upon obtaining robust, task-oriented values that can also serve as a basis for risk assessments. The task profile has an important function in this context. It describes the factors contributing to exposure, and in combination with the measured values permits a realistic estimation of the average working time spent outdoors.

MEASUREMENT CAMPAIGN

The IFA has used GENESIS-UV to collect and analyse detailed UV exposure data for the most diverse of outdoor tasks. The measurement campaign is a joint project conducted by the IFA and several individual accident insurance institutions. 800 employees in a number of professions have been involved to date in the project, which has been running since 2014 from the beginning of April to the end of October each year. During work, they wore dosimeters on the upper arm that measured the radiation. This has enabled over 3 billion valid data records to be produced to date, equating to well over 80,000 days of measurement.

Almost 100 different occupations have been studied. The range of the exposure values was shown to be very wide, differing between occupations by a factor of up to 15. The values for the occupation with the highest exposure were over four times the assumed average for the German population.

Of the ten occupations exhibiting the highest exposure levels, several are in the construction industry. On construction sites, work is frequently performed where no shade is available, and owing to the nature of the work, employees are unable to protect themselves against excessive exposure. A surprising observation was that professions in agriculture, such as farmers on arable farms of various sizes, are not among the most highly exposed professions. Analysis of the task profiles shows that the employees spend much of their working time in air-conditioned agricultural machines and must generally leave them only for the duration of set-up tasks.

Further results, in some cases surprising, are available and are to be published in an IFA Report. The knowledge gained by means of GENESIS-UV enables hazards to be quantified better and protective measures to be formulated. The objective of proposing and developing task-specific prevention measures has thus come a substantial step closer to fruition.

RECOMMENDATIONS

DGUV Informative Publication 203-085 concerning working in the sun advises companies with employees working outdoors to include suitable measures for protection against the sun in their

risk assessment. At the same time, the publication provides a brief summary of the effect of solar radiation, information on risk assessment, a checklist of practical protective measures, and selected Internet links. Personal protection measures are intended only as supplementary measures; clothing covering the whole body is the measure of choice. UV skin-protection products are used as a further measure.

RESOURCES

Further resources for use in day-to-day work in companies are planned. These include:

- Instruction and training: modules for use across all sectors for the instruction of employees; the modules are to be suitable for adaptation to different sectors by the individual accident insurance institutions. Besides the use of leaflets, the use of cutout animations and/or interactive elements is an option.
- Qualification: modules for training or qualification, geared to particular target groups, for training concepts within a research project. These modules are integrated into existing education arrangements. Points of contact are disseminators who can provide advice on the subject to companies. ●

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Task-oriented assessment:
Dr Marc Wittlich, marc.wittlich@dguv.de
Web link www.dguv.de
► solar radiation protection
► skin cancer
Brochure entitled "Arbeiten unter der Sonne": www.publikationen.dguv.de
► DGUV Information 203-085;
Comprehensive information on the measurement campaign and its results is available at:
www.dguv.de/genesis

OCCUPATIONS WITH THE HIGHEST EXPOSURE

UV RADIATION EXPOSURE

Extrapolated annual exposure value in SED*



* Standard erythema dose: 1 SED is sufficient to cause sunburn on skin type 1 (pale skin, reddish hair)

Source: DGUV

CHILDREN'S DAY-CARE FACILITIES AS A LIVING ENVIRONMENT

If people are to make a culture of prevention their own, they must be convinced of it in the environments in which they live. The earlier, the better. The detailed concept entitled "Promoting safety and health in preschool education" lays the foundation for this in children's day-care facilities.

The living environment of children's day-care facilities is particularly significant for sustainable and effective prevention.

In these facilities, children are reached at a phase in which their personal awareness of safety

and health is formed and their competencies in various areas are developed.

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Thus, in order to promote better health-related opportunities, safety and health must be integrated into preschool education. Not least for this reason, children's day-care facilities are regarded as one of the key living environments for prevention work in the federal framework recommendations issued by the national prevention conference for implementation of the German Prevention Act (PrävG).

Children's day-care in Germany has undergone considerable restructuring in recent years. Day-care facilities have been extended, and whole-day care and the care of under-threes has increased. At the same time, binding education plans have been established as a quality framework, since

preschool education in children's living environments is a key element of healthy development.

PREVENTION WORK AND QUALITY OF EDUCATION

What form must prevention work take if it is to meet both the underlying requirements currently imposed by society, and the particular demands of the living environment of a children's day-care facility? The findings of educational research reveal a close interrelationship between the quality of an educational facility and the health of those involved in it.

Accordingly, prevention and health promotion, and also the effective establishment of safety and health in educational facilities, are effective when they are based upon the educational mandate. Safety and health in children's day-care facilities should not be regarded as supplementary tasks, but as an integral part of the educational activity. Effective preventive intervention activities must be shaped such that they retain and ideally improve both safety and health and the quality of education. Examples of such intervention activities are promo-

tion of a good social and educational climate and of a culture of feedback.

LINKING EDUCATION AND HEALTH

Based upon these observations, the DGUV expert committee "Educational facilities" has developed the detailed concept entitled "Promoting safety and health in preschool education". The concept links the topics of safety and health – the statutory mandate of the German Social Accident Insurance Institutions – with the education mandate of children's day-care facilities. The detailed concept targets integration of safety and health into processes within children's day-care facilities, and thus contributes to a culture of prevention being established in preschool education.

In the future, the detailed concept is to form the theoretical basis of prevention work for the accident insurance institutions within the living environment of children's day-care facilities. It is based upon the scientific approach of the "good healthy children's day-care facility", which regards these facilities as a living



environment for children, professional educators and parents. The quality of education and the promotion of health are regarded as mutually determining factors: health is an essential element for working and learning in a children's day-care facility, and at the same time constitutes both the foundation and the outcome of successful education processes. Education is therefore both a precondition for health, and the outcome of a health-promoting children's day-care facility.

REFERENCE FRAMEWORK: "GOOD HEALTHY CHILDREN'S DAY-CARE FACILITY"

The core element of the "good healthy children's day-care

facility", and therefore of the detailed concept, is a reference framework for the quality of these facilities. The concept serves as a stimulus for the individual development of each facility. With its support, the children's day-care facilities are able to promote education and health within a continual process. On this basis, the employees in each facility develop their individual strategies and structures in order to establish safety and health within it and to attain their mutually agreed targets.

In line with their prevention mandate, the accident insurance institutions launch such processes of organizational development and support

facilities seeking to implement the strategy of a "good healthy children's day-care facility". At the same time, they are involved in framing social and educational policy for sustainably effective prevention activity in preschool education.

STARTING-POINT FOR COOPERATION

The detailed concept is based upon a holistic understanding of prevention. It encompasses measures for safety and health promotion. The detailed concept thus provides many starting-points for cooperation between the German social insurance bodies as required by the German Prevention Act. ●

▲ In the detailed concept, safety and health are considered to be integral elements of the living environment of children's day-care facilities



CHILDREN AND PREVENTIVE HEALTH RESEARCH

How can children's awareness of accident hazards and health protection be enhanced? By play, of course!

▲

Cuddly toy with hearing protection and reflective jacket

“Children and preventive health research” is a project conducted jointly by the IFA and the German Social Accident Insurance Institution for the public sector in Rhineland-Palatinate. The idea is based upon the concept of the “Haus der kleinen Forscher” (Little Scientists’ House), Germany’s largest educational initiative in the preschool sector.

The project makes prevention topics accessible to children through a research process that builds upon their everyday experiences. In other words, it translates their existing knowledge into scientific observations. For example: what makes a high-visibility

jacket so special compared to other items of clothing? How does it protect me? By conducting simple experiments, children can answer these questions themselves.

TOPICS

Seventeen simple experiments were developed for the project. They introduce the topics to the children by play, and are assigned to five areas of preventive activity:

- Visibility in road traffic
- Tripping – slipping – falling
- Hygiene and skin protection
- Toxic household substances
- Noise

MATERIALS

The research ideas are presented in an illustrative and practical way in the form of experiment cards similar to recipes. Each experiment card provides ideas for research and further activities. Structure of the experiment cards:

- Description with illustrations
- List of required materials: these are chiefly readily available, everyday objects
- Ideas for extended activities
- Background knowledge
- Prevention objectives

DISSEMINATOR FUNCTION

The best way for people to access new content is by experiencing it for themselves. The preschool teachers are the first point of contact for introducing the experiments into the educational institutions. They have a disseminator function, besides being the ones who will actually investigate hazards and protective measures together with the children. In the future, the preschool teachers are to have the opportunity to familiarize themselves with the project and the material in two one-day

workshops conducted by trainers who have themselves received training. At the workshops they will be able to try out the experiments themselves together with colleagues from other educational institutions.

The preschool teachers’ positive learning experience is the guarantee for their commitment to implementing the project. Besides the conducting of experiments by the participants and the pooling of experience between them, the workshop is also concerned with pedagogical content: how do children develop an awareness of danger, and how can a culture of prevention be established in schools and preschool facilities?

FIRST STEPS

The first step for preparation of the research ideas was publication of the 17 experiment cards on the websites of the project partners at the beginning of 2017. Disseminators are now sought for creation of a training network in which introductory workshops for the preschool teachers can be conducted, ideally across the country. In the meantime, information published on the Internet provides interested schools and preschool facilities with an introduction to the researching of safety and health topics. ●

EVALUATING ODOURS

When unexpected odours occur at indoor workplaces, employees are concerned and expect to be informed of possible consequences for their health.

A research project aims to assist the German Social Accident Insurance Institutions in assessing the indoor air quality and the associated disorders.

The accident insurance institutions have been addressing the subject of indoor air quality and subjective disorders at indoor workplaces for many years. One reason for this is their extended prevention mandate in accordance with Paragraph 1 of the German Social Code (SGB), Volume VII, concerning the prevention of work-related health hazards. An objective of the accident insurance institutions is to detect and assess chemical contaminants in the atmosphere of indoor workplaces in accordance with standardized procedures. Such standards assist in the systematic assessment of health complaints attributed to contaminants. Reliable reference values for atmospheric hazardous substances in indoor work premises and in particular in offices have for example been set.

ASSESSMENT

However, indoor air measurements and assessment against guideline or reference values do not always lead to the issue being resolved, and the causes of odours or health complaints often remain unclear. One deficit is a lack of values by which the health complaints recorded by means of questionnaires can be compared to a non-exposed, nor-

mal reference population. In particular, a harmonized procedure is lacking by which complaints of annoying odours can be evaluated objectively.

JOINT PROJECT

Two of the DGUV’s research institutes, the IPA and the IFA, have responded to this situation by launching a joint project on the impact and assessment of odours at indoor workplaces. A pilot study conducted in 2016 in the DGUV’s offices yielded survey results and also indoor measured values for volatile organic compounds (VOCs) and aldehydes, the carbon dioxide (CO₂) concentration, and atmospheric temperature and humidity. The results confirmed that the questionnaire is suitable for proper determining of user satisfaction with the indoor air quality.

MAIN STUDY

In 2017, the researchers will survey insured individuals in the offices of companies and institutions in which no complaints regarding the indoor air quality are known. They will generate comparative values from the incidence of complaints concerning the room climate, health complaints, and reported odour perception and nuisance. In order

to rule out contaminants in the atmosphere, the experts will perform accompanying indoor and climate measurements.

Office workplaces will first be examined. The results will also be used to optimize the new MGU measurement strategy (measurement programme

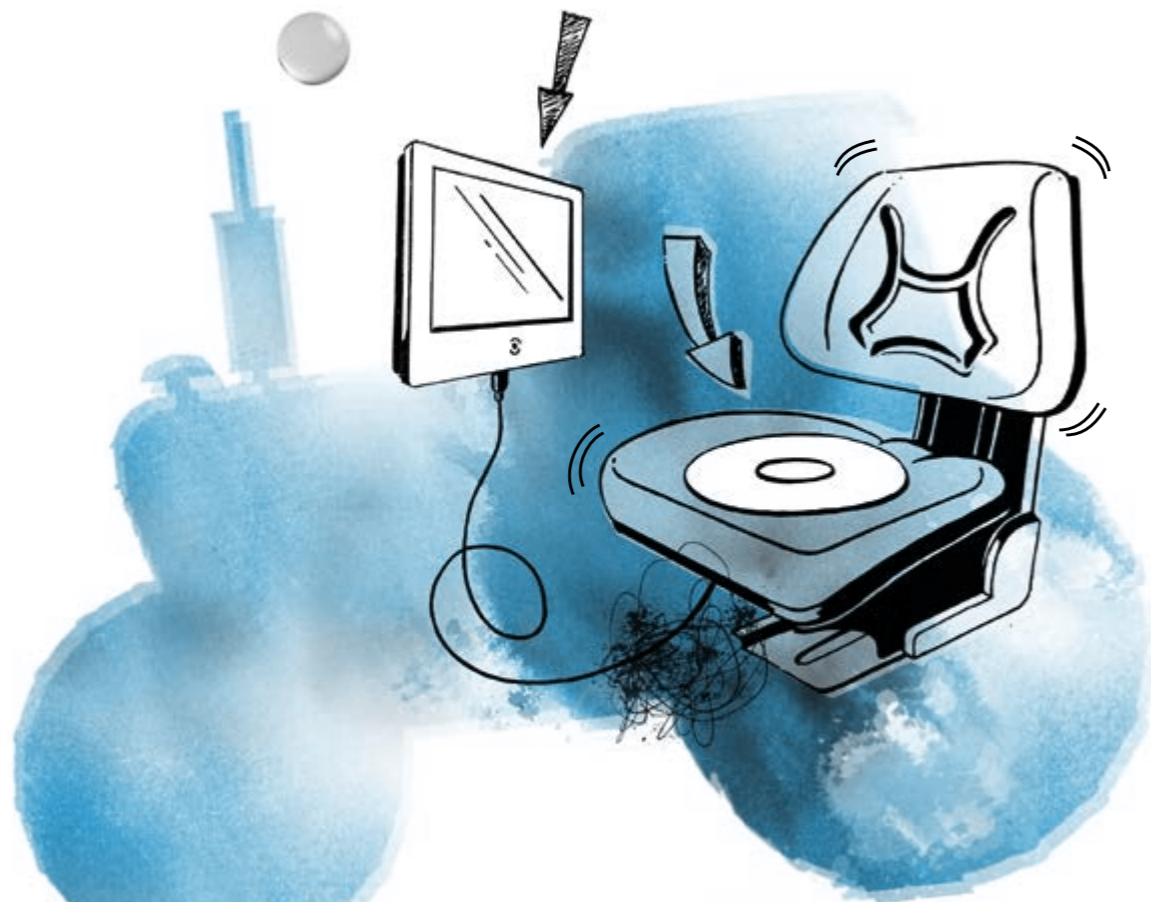
9124 – indoor measurements in accordance with the measurement strategy for office workplaces), introduced in 2016. The results of the main study are intended to support the DGUV report on indoor workplaces. The questionnaire can be used in future to examine the following aspects:

- Reports of complaints
- Necessity for and/or efficacy of measures, for example before and after decoration/renovation
- Evaluation of buildings; certification of new buildings if applicable

Extension to other indoor work-places such as schools and preschool childcare facilities is conceivable as a follow-on project. ●

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Web link DGUV report on indoor workplaces at www.dguv.de,
Webcode: d650356

► Visible vibration: the mounting disc on the driver's seat detects the vibrations and transfers the values to the display in the tractor.



RAISING AWARENESS OF VIBRATION

A simple item of equipment for visualizing vibration raises workers' awareness of exposure to it.

Vehicles in use are a source of vibration. Workers who drive or operate vehicles at work are exposed to this in the form of

whole-body vibration. The level of exposure depends upon the driving style, the seat adjustment and the driver's

posture, as well as environmental factors. It is difficult for workers to estimate what vibrations they are exposed to. It is therefore advantageous if their own subjective perception can be linked to an objective assessment.

This makes the workers aware of the exposure and that they can influence it to some extent themselves, for example by adjusting their driving style and the driver's seat.

VIBRATION DISPLAY

The IFA has developed an instrument by which vibration exposure can be visualized for workers. The instantaneous vibration exposure is displayed in traffic-light colours (red-amber-green), and can be understood at a glance. Whole-body vibration is measured in three axes by a mounting disc placed on the driver's seat. An estimation of the exposure is shown continually

on a display. Should the vibration lie above the exposure limit, the column appears in red. If only the action value is exceeded, it appears in amber. If it is below the action value, the column appears in green (traffic-light principle). The display is suitable for use in daylight and can be fitted easily in the driver's cab. All functions can be operated by means of a single button. The drivers can now see at a glance how a change in driving style or seat adjustment affects the vibration exposure, and can make corresponding adjustments. The instrument can also be used for training and instruction purposes. ●

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► Fachinfos ► Belastungsanzeige für Ganzkörper- und Hand-Vibrationen

EVALUATION OF DGUV REGULATION 2

The reform of the accident prevention regulation: "Occupational Physicians and OSH Professionals" has been evaluated. The results of a large-scale survey are to be used to adapt the regulation to the needs of enterprises.

The reformed accident prevention regulation governing company physicians and OSH professionals (DGUV Regulation 2) came into force on 1 January 2011. The regulation is a legislative measure agreed between all German Social Accident Insurance Institutions, the Federal Ministry of Labour and Social Affairs (BMAS) and the Commission of the German regional governments for occupational safety and safety engineering (LASI). Its purpose is to support the German Occupational Safety Act (ASiG).

The objectives of the reform are as follows:

- Equal treatment of similar companies
- Introduction of a company-specific, hazard-based approach to supervision
- Closer gearing of the supervision services to content
- Clear definition of the services
- Improved cooperation between parties involved in OSH at company level
- Fostering of independent action on the part of companies/administrations
- Consideration of topical requirements for supervision

The reform primarily affected Annex 2, concerning the standard supervision of companies with over 10 employees. This annex governs both the form and scale of complete supervision, which comprises basic supervision and company-specific supervision.

EVALUATION DESIGN AND METHODS

Consideration was given to evaluation whilst the reform was in progress. The evaluation process was launched in 2014 by the Prevention Principles Committee of the DGUV. Overall control lay with a project committee comprising representatives of the DGUV, the individual German Social Accident Insurance Institutions, and the DGUV's Organization of occupational safety and health expert committee (FB ORG). The project committee was supported by a group of experts from the BMAS and the BAuA, the DGUV, the LASI and the individual accident insurance institutions. The social partners and professional and industry associations were also involved.

Evaluation focussed upon Annex 2 and considered:

- Its degree of implementation
- Its practicability
- Its consequences

The project team employed a range of methods: firstly, standardized questionnaires, in order to ensure a high level of reliability and validity; and secondly, semi-standardized, more detailed interviews.

PERFORMANCE OF THE EVALUATION

FROM JUNE TO AUGUST 2016:

- Standardized telephone interviews (1,641 long, 959 short) with 2,600 members of company

management, broken down between small, medium-sized and large companies

- 425 standardized telephone interviews (274 long, 151 short) with members of employees' representative bodies
- Written survey of the prevention departments of the accident insurance institutions and the state occupational safety and health authorities; the questionnaires were returned by 13 state authorities and 25 accident insurance institutions

FROM AUGUST TO OCTOBER 2016:

- Standardized online surveys of 241 occupational physicians and 772 OSH professionals

UP UNTIL DECEMBER 2016:

- Telephone interviews with occupational physicians and OSH professionals with reference to a semi-standardized guidance document

RESULTS

The results were prepared by the project committee and submitted to the relevant bodies at the DGUV in 2017 for discussion.

The Organization of occupational safety and health expert committee (FB ORG) is to review the amendment of DGUV Regulation 2, giving particular consideration to the results of the evaluation. ●

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4.0 WORKFOURPOINTZERO



I'd like to see the established concept of a 'safe limit' supplemented by the metaphor of a 'healthy balance'.



Interview with Dr Martin Braun,
Fraunhofer Institute for Industrial Engineering (IAO)

“PREVENTION 4.0 ADDRESSES SAFETY AND HEALTH AT WORK”

Interview with Dr Martin Braun,
Fraunhofer Institute for Industrial Engineering (IAO)

Dr Braun, you have been addressing the vision of Industry 4.0 and Work 4.0 for some time. What new technologies do you consider particularly relevant in this context, and what do you find so fascinating about them?

Innovative technological products fascinate us because they make visions of the future tangible. I am impressed for example by exoskeletons, such as those that we are prototyping at Fraunhofer. These products combine cutting-edge sensor and actuator technology with the seemingly revolutionary idea of amplifying human muscle force. It will however be some years before exoskeletons are ready for everyday use.

In my view, the really fascinating aspects of the technology found in World of Work 4.0 become apparent only at second glance. Examples that spring to mind range from complex information networks in trade and logistics and multifaceted data flows on mobile customer front-end devices, through enterprise resource planning and warehousing systems, to real-time distributed storage distribution systems. Behind the scenes at the major platform operators, we are wit-

nessing directly how information forms the nucleus of our economic activity by using digitalized processes to forge communication between customers, dealers and suppliers.

Many experts believe that the introduction of new technologies will not only deliver economic benefits, but will also make the lives of working people easier, and for that matter facilitate the inclusion of persons with constrained abilities. Others draw attention to new hazards. What needs to be done in order to reduce hazards to a minimum from the outset?

If complex processes in cyber-physical systems cannot be managed suitably, inappropriate system interventions may lead to disruptions that are difficult to control and that present considerable potential hazards. Consequently, it must be ascertained to what extent operative personnel are able to exert effective influence upon the work system and thus to assume responsibility for safe and productive operation of it. Besides changes in task requirements, extended modes of interaction and monitoring for human beings and machines



I am convinced that the core tasks of healthy personal and group leadership will also rise in importance in digitalized forms of work.



must be considered. Virtual displays and remote, multimodal control elements provide considerable scope for design options with a major bearing upon safety. Finally, it must be ensured that technical systems possess adequate safety functions, such as sensors, redundant system design or guards.

During installation of a collaborative lightweight robot, we recently gathered practical experience of the potential safety risks presented by digital technologies the processes of which are not always graphically clear. Based upon a risk assessment, my colleagues and I quickly agreed that training of the skilled person-

nel was crucial to the safe use of human-machine systems. The relevant safety rules of the German Social Accident Insurance Institutions proved to be exceptionally helpful for this purpose.

The risk of collision between human beings and unguarded robots can be reduced to a minimum by sensor systems. When, for safety reasons, the robot reduces its velocity as it approaches a human being, the overall productivity of the working system is limited as a result. Negative impacts upon productivity will probably also determine the scale on which collaborative human-machine systems are used in the future.

Discussion of the German Federal Ministry of Labour and Social Affairs' green and white papers on Work 4.0 was not limited to technical aspects: issues of work organization when work is not constrained by time and space were a particular issue. Does an ideal model exist for orientation?

Adam Smith demonstrated over 200 years ago with his economic concept of the division of labour that productive work is predicated upon the interaction between functional specialization and coordination. For work to be successful, human beings must on the one hand have adequate latitude to develop their abili-

▲
Future Work Lab
of the Fraunhofer
Institute



► The exoskeleton tracks the movements of the arms and supports the physical force exerted by the wearer

ties and pursue their personal interests; on the other, individuals are compelled to cooperate in a production process in order for the entrepreneurial objective to be attained. Relevant studies demonstrate that balanced cooperative relationships of this kind have an impact not only upon a company's productivity, but also upon human health.

Organization of the division of labour has always required finding the balance between personal autonomy and collective coordination. Global competition and the pursuit of continual improvement now present major challenges to this balance. In the dynamic of the digitalized world of work, company organizational charts and job descriptions – the elements that describe the Tayloristic view of work – are losing their significance.

Agile companies demonstrate how complexity can be overcome by suitable strategies for self-regulation. Rules for cooperation that enjoy the confidence of the participants enable individuals to develop their skills at their own initiative. This equips them to modify critical stress situations independently. The autonomy of the individual ends where binding forms of cooperation begin – forms of cooperation based upon decisions reached collectively and underpinned by a commitment to responsibility. Balanced cooperative relationships of this kind are the basis for the ideal model of a “healthy culture of prevention” in companies. To this end, I'd like to see the established



concept of a “safe limit” supplemented by the metaphor of a “healthy balance”.

Some companies are already trialling new working time models, following agreement between the employer and employees' representation. How do these models square up?

In a dynamic world of work, sustainable agreements for working

hours flexibilized with the target group's interests in mind and supported by statutory standards appear to be absolutely essential. It must be considered here that hours of work not only have a quantitative dimension in terms of their length and the location at which work is performed, but also have a qualitative impact upon the working process, in that they divide it into alternating phases of strain

and recreation. On the whole, the positive effect of recreation upon performance is however considerably underestimated.

The observation of the German Social Accident Insurance is that occupational safety and health is most effective when management personnel themselves are convinced of its significance. Under Work 4.0, hierarchies will be even shallower than they are at present. Will management personnel be replaced by computer programs or by artificial intelligence?

Decentralized forms of organization in World of Work 4.0 necessitate close coordination of the individuals' performance, purposeful communication of decisions, and strict enforcement of generally binding rules. These tasks require social skills and mature values on the part of the management personnel. Systems of artificial intelligence are not able to simulate such contextual skills adequately. I am therefore convinced that the core tasks of healthy personal and group leadership will also rise in importance in digitalized forms of work.

What roles will be played in future by crowdworkers and other independent sole traders?

As long as income remains coupled to gainful employment, forms of work such as crowdworking and clickworking will not become significantly more common. Such jobs will probably emerge as marginal secondary employment. One reason for this is that simple clickwork is

increasingly being automated by specialized bots. Another is that demanding tasks are not suited to the click-job format.

How do you envisage “Prevention 4.0”?

“Prevention 4.0” addresses safety and health at work. It is governed by the underlying conditions at the company concerned. Its efficacy and acceptance can be measured by the extent to which it contributes to fulfilment of the company's mission. In World of Work 4.0, many companies face challenging demands from a volatile customer market. If a company wishes to compensate for disruptive factors arising from the variety of its market environment, it must also increase the variety of its own action, preventively. An indicator of a company's capacity to cope with unplanned challenges is the health of the people working in it.

Sustainable preventive activity is not therefore an end to itself, but fosters an indispensable corporate transformation by placing the focus upon human beings and their specific potential skills. To this end, it carries the principles of humane organization of work such as safety, social adequacy, and conduciveness to learning, into effect. Where a company's structure is based upon the division of labour, the goal of “Prevention 4.0” is to raise the variety of action predictively to enable the company to compensate effectively for unplanned disruption in its dynamic market environment. It is therefore as beneficial to workers as it is to the company. ●

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It must be ascertained to what extent operative personnel are able to exert effective influence upon the work system and thus to assume responsibility for safe and productive operation of it.

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NEW FORMS OF WORK

▲ Under the heading “Brave new world of work?”, the position paper entitled “New Forms of Work – New Forms of Prevention” was presented in Berlin on 29 April 2016, accompanied by a panel discussion

Changes in the world of work necessitate proactive prevention activity. In its position paper entitled “New Forms of Work – New Forms of Prevention”, the DGUV has set out fundamental principles for the structuring of safe and healthy work for the future, and has submitted them to policy-makers for debate.

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Web link Discussion event:
“Brave new world of work?”:
www.dguv.de, Webcode: d1019571
Position paper: “New Forms
of Work – New Forms of Prevention”:
www.dguv.de, Webcode: d1171882

In the “New forms of work” (NFA) sub-committee of the DGUV’s “Organization of occupational safety and health” (FB ORG) expert committee, scenarios of future forms of work are an ongoing topic. The focus in all these scenarios lies upon future worlds of work being organized humanely.

POSITION PAPER

The NFA sub-committee compiles the latest findings on the topic in the area of human factors in order to use them to formulate principles for prevention. Based upon these findings, the sub-committee has already drawn up several

specific guidance documents. By contrast, the new position paper entitled “New Forms of Work – New Forms of Prevention” addresses the topic from a more comprehensive perspective. This paper, published by the DGUV in the form of a brochure, examines the aspects of technology, flexibilization, leadership, and possible new forms of employment.

It concludes by describing the resulting challenges for occupational safety and health. In the next step, the strategies for solutions sketched out in the position paper are to be developed into specific recommendations for action.

DISCUSSION EVENT

Dr Susanne Roscher (VBG), Head of the NFA sub-committee, and Dr Walter Eichendorf, Deputy Director General of the DGUV, have jointly presented the position paper to the specialist public. The occasion for this presentation was the discussion event launched by the DGUV and held in April 2016 on the subject of a “brave new world of work”. Both this event and the position paper itself have met with wide and sustained interest in professional circles and among the broader public. By submitting its position paper to the current intense political debate concerning changes in the world of work, the DGUV has called from the perspective of prevention for fundamental principles to be observed in the structuring of safe and healthy work in the future. ●

FURTHER DEVELOPMENT OF TRAINING ACTIVITY

The prevention-related training measures of the German Social Accident Insurance Institutions reach some 372,000 people every year. This puts the institutions among Germany’s largest providers of adult education. Together, the experts at the institutions develop innovative and needs-oriented training products.

With their training provision, the German Social Accident Insurance Institutions fulfil their statutory prevention mandate under Paragraph 14 of the German Social Code, Volume VII. In order to continue to provide effective support to companies as the world of work changes, both the initial and further training of the labour inspectors and the “Training” prevention service must address the challenges associated with Work 4.0. The accident insurance institutions are supported in this task by the Committee for initial and further training (AAW) established by the DGUV’s Prevention Managers’ Conference.

MAJOR TRENDS

Developments in the world of work are characterized by the following major trends: digitalization, flexibilization, globalization and demographic change. More and more work processes are being digitalized. Work is increasingly characterized by ambient technologies, virtual work environments and self-organizing production systems. At the same time, modern information and communications technologies permit flexible forms of work that are not constrained by time and location, such as teleworking and virtual team work. These developments also have an impact upon safety and health in companies. They have a wealth of benefits, such as relieving workers of routine tasks and better reconciliation of occupational and family life. Mental stresses may however also be anticipated, and the use of new technologies may give rise to new hazards.

FORMS OF TEACHING AND LEARNING

The emerging changes also generate new challenges for the prevention-related training activity of the German Social Accident Insurance Institutions. The AAW is currently closely addressing these challenges. Industrial practice requires effective, efficient and flexible forms of teaching and learning in which the content is tailored to the specific tasks in hand. This makes autonomous, task-oriented learning possible. At the same time, good time management is expected: training measures are to be geared to the work situation, thereby enabling the subject matter learnt to be applied directly. The committee also addresses how people with different learning habits can best be reached, such as digital natives and older employees. The opportunities presented by digitalization, such as e-learning and flexible training formats, are also exploited to the full. In consideration of these aspects, the AAW is currently developing its work further in order to be able to support the accident insurance institutions in their future training activity with innovative products geared to the actual needs. ●

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WEARABLES AT THE WORKPLACE

Wearable technology is a topical technical trend that has now also reached the world of work. The IFA's experts are assessing its impacts upon human beings.

► Three categories of wearables are defined:

1. Systems worn on a single part of the body
2. Smart textiles with multiple integrated sensors
3. Complex measurement systems comprising different sensors on different parts of the body

Wearables are computer and sensor systems that are worn directly on the body and that interact with the wearer according to the context. Common examples are smartphones, smart watches, and fitness trackers that record physiological variables and deliver information on the state of the wearer's health. Smart textiles with integrated sensors are also appearing on the market in increasing numbers.

Germany's health insurance institutions are observing these technical developments with great interest, since the devices are able to provide support during the provision of health advice.

Around 20% of Germans already use medical and health apps that log values such as pulse rate, respiration or distances run, possibly com-

pare them with limits, or make suggestions regarding exercise and nutrition. Besides the potential benefits however, a risk also exists of incorrect diagnoses.

PRACTICABILITY

Wearables are increasingly being used in the world of work – a development that the IFA is observing closely. In cooperation with the Koblenz University of Applied Sciences (RheinAhrCampus Remagen), the institute's experts are testing firstly the accuracy of measurements of physical parameters and secondly the scope for use of these devices at the workplace. An example application is study of lack of movement during performance of a task. In Germany, the number of workplaces at which workers barely move is increasing. This physical inactivity is being discussed as a risk factor for the incidence of musculoskeletal diseases, obesity, cardiovascular disorders and type II diabetes. Wearables can be used in this context in order to record physical activity and to identify relationships between movement patterns at the workplace and the workers' state of health. The experts consider which devices are able to record the desired parameters reliably.

CLASSIFICATION

The IFA has produced classifications for wearables according to their sensor technology and general characteristics. A distinction is drawn between the facility for recording physiological parameters and the means by which the device is attached. The scope and precision of the recorded physiological data increase with an increasing number of sensors.

The institute's research activity for the classification and evaluation of wearables is input into general activities conducted by European OSH institutes within PEROSH (Partnership of European Research in Occupational Safety and Health). Led by the Danish National Research Centre for the Working Environment, an international team is currently drawing up recommendations for action for the measurement of physical activities, and is describing specific application scenarios. ●

THE INTERPLAY BETWEEN SAFETY AND SECURITY

With the advent of Industry 4.0, human beings are being networked with machines, data with objects. This creates interfaces within the areas of safety and security.

Should a machine control system fail, a hazard may arise for the operator. In an industrial environment, it is logical for the associated risks to be considered under the heading of functional safety. The progress of digitalization is accompanied by greater networking of products; often however, the changes also require consideration to be given to the security of the information technology used in industrial products. In some cases – the remote maintenance of installations is a pertinent example – both aspects must be considered.

CYBER ATTACKS

The issue of security includes threats presented by the hacking of machinery. Such threats are no longer limited to economic loss caused by espionage or sabotage; the impacts of attacks upon machine control systems are now also being observed. One documented example of such an attack is the Stuxnet computer worm, which was able to take control of the frequency converters of plant equipment and was used to commit sabotage. Another example is the cyber attack upon a German steel plant in 2014, which caused an outage of parts of the installation, resulting in considerable damage to a smelting furnace.

COMMON FACTORS

It is advantageous for safety and security to be considered together at certain points in a product's life cycle. This helps to prevent influences upon the two aspects from being underestimated or miscalculated, and is also likely to be the more efficient approach. The two aspects should ideally be considered in combination as early as the risk analysis stage. A further example is failure mode and effects analysis (FMEA). When safety and security aspects are considered separately, their reciprocal influence is overlooked. It is therefore essential for experts from both areas to be involved in the analyses. Frequently however, these experts are employed in different departments within companies, making the crucial sharing of information difficult in practice. Conversely, when safety and security experts work together, protective mechanisms for data transmission can be of mutual benefit. Examples are the protection provided against networked risks by data integrity assurance and authentication of connections. A security weakness, owing for example to missing or inadequate password protection, can also impact adversely upon any configurable item of protective equipment or safety-related control.

DISTINCTIONS

Despite the overlap between safety and security, a clear distinction exists. Besides differences in classification schemes within the relevant standards, security analysis is a continual process; by contrast, safety generally undergoes little change once equipment has been placed in service.

In the future, it will be increasingly important to consider the security aspects of industrial products with a bearing upon safety. The IFA is addressing this trend in ongoing investigations and during the testing of machines and products. It is also party to the launching of standardization activity specifically concerning the machinery sector that embodies the approach of considering safety and security in combination. Furthermore, the IFA supports the activities of the DGVU in this area, for example in the preparation of a DGVU informative publication. ●

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WORKING WITH DATA GOGGLES

The advent of the digital world has been accompanied by the appearance of new forms of work equipment, such as head-mounted displays and data goggles. At the IFA, prevention research is being conducted into the potential hazards presented by these products.



▲ Data goggles are used for interaction between human beings and systems

Work equipment for human-system interaction may present both new opportunities and hazards for workers. The IFA's experts are closely investigating new developments such as head-mounted displays (HMDs)

and data goggles. These are small displays worn on the head of the worker or integrated into spectacles. They display additional information such as text and images in digital form directly in the wearer's field of

view, leaving the hands free for other tasks. Such applications generate an augmented (extended) or virtual reality, for which different forms of data goggles and HMDs exist.

AREAS OF APPLICATION

Data goggles are increasingly being used in plants in order to:

- Support workers in particular task situations, for example for the communication of information for remote diagnostics at work locations that are difficult to reach
- Structure and monitor workers' performance of their tasks, for example in logistics
- Guide workers and provide them with information during performance of their tasks, for example by communicating instructions, procedures or messages
- Simulate virtual worlds of work, in order to design new work equipment and provide training in processes

PROJECTS

Together with partners from academia, the IFA is currently conducting a number of projects within this spectrum of applications:

THE USE OF DATA GOGGLES FOR THE SAFE PREPARATION OF INDUSTRIAL TRUCKS FOR SERVICE
Industrial trucks may be placed in service only following performance of a safety check. The items to be checked concern externally visible sources of hazard. They are checked off on a paper list, which is then passed on to the OSH professional, if applicable with indication of faults requiring rectification. In order to speed up this process, the checklists in the project are processed digitally, and forwarded in real time if at all possible. This enables hazards, such as damage to the vehicle, to be reported and repaired without delay.

DATA GOGGLES AT ORDER-PICKING WORKPLACES

A further IFA project is examining the physiological impacts and acceptance of data goggles at order-picking workplaces. Stresses attributable to the use of data goggles are identified by measurements and evaluated, together with information on the goggles' acceptance. The aim is to produce recommendations for the use of data goggles suitable for application in the field.

DATA GOGGLES FOR THE SIMULATION OF WORK SITUATIONS

A further application of data goggles in the field of OSH is the simulation of future and/or hazardous work situations. Simulation is used both for conceptual work design and for retrospective accident analysis. The IFA is conducting a number of specific prevention projects in its VR laboratory for this purpose. ●

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▲ Monocular data goggles, as used for example during order-picking tasks.



▲ Binocular head-mounted display generating a virtual reality.

TRAINING OF MANAGERIAL STAFF

Managers are the lynchpins of companies, and this is also true in the area of prevention. The particular requirements to be met by training measures for this target group are to be defined in a DGUV project.

The directors, senior managers and other management personnel of companies describe firm objectives in a dynamic process, and develop strategies for their attainment. They are responsible for implementing these strategies within their respective areas of responsibility, and organize the necessary working and production processes and the working conditions accordingly. Management personnel thus exert a crucial influence upon the level of safety and health and upon the prevention culture in their companies. As organizers and decision-makers, this target group is particularly important for the accident insurance institutions' training activity in the area of prevention.

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TRAINING FORMATS

The Committee for initial and further training (AAW) is currently conducting a project to determine

what training formats are effective for management personnel and what aspects the accident insurance institutions must consider during development of their training provision.

As it changes under the influence of digitalization, flexibilization and demographic trends, the world of work places particular demands upon management personnel. They must reorganize work by digital transformation yet at the same time inspire confidence among the workforce in the new forms of work and working practices. Equally, the demand for greater flexibility in the performance of workers on the one hand also necessitates flexible management instruments on the other. Examples of this are indirect management methods

involving agreed targets, and remote management in the case of teleworking and home working. Where such methods are implemented, superiors must ensure that the safety and health of workers is not adversely affected.

MANAGEMENT CULTURE

These new changes require a change in management culture, and suitable training to bring such a change about. Concern for the safety and health of workers continues to be an integral task of management in a digitalized and flexibilized world of work. It is therefore important for management personnel to be provided with training measures that on the one hand are tailored to their key function and on the other foster development of a management and prevention culture within companies.

GUIDANCE DOCUMENT

Since the potential for technical safety has often already been exploited virtually to the full, further improvements in safety and health in companies can be attained only by changes in attitude and behaviour. These aspects are taken up by the AAW's project, which has the purpose of producing a guidance document for the accident insurance institutions containing firm recommendations for the development of training provision for management personnel. In particular, the project is closely coordinated and linked with activities relating to "Vision Zero" and with the prevention campaign under the heading "Culture of prevention". The project is scheduled to run until the beginning of 2018. ●

TRAINING OF LABOUR INSPECTORS

Changes in the world of work also have an impact upon the training of labour inspectors. Their training must keep pace with developments, and at the same time must have a quality assurance function.

The German Social Accident Insurance Institutions face numerous challenges with regard to growing digitalization and flexibilization of the world of work, and it is not yet clear what impacts these developments will have. Nevertheless, the accident insurance institutions are preparing for possible scenarios by conducting proactive risk observation that takes particular account of the experience and insights of the labour inspectors.

INITIAL TRAINING

The initial training of labour inspectors, which was restructured only a few years ago, gives consideration to their future tasks in a world of work that is undergoing change. The training demands and supports lifelong learning, since in order to perform their duties professionally, labour inspectors will continually have to deal with new topics. One essential subject of the initial training is the relevance of mental stresses to a range of issues, aspects of health at work, and preventive activity in networks, particularly within the context of the Joint German OSH Strategy (GDA).

Through regular evaluation, the provision of initial training is developed further and its quality assured by the workgroup for initial and further training, which is responsible for the training of labour inspectors and other prevention professionals. Emerging future topics in prevention are reviewed for their relevance to training and integrated, where necessary, into the initial training of labour inspectors.

"The initial and further training of labour inspectors can be compared to building a house. Initial training is similar to construction of the shell of the building: it defines the essential properties. Further training lends the labour inspector the required detailed competencies, in the same way that the décor and the bathroom and kitchen furnishings of a house are crucial to whether its occupants feel comfortable living there. And they will also decorate it as needed at regular intervals."

FURTHER TRAINING

Since the relevant topics in a rapidly changing world of work cannot all be considered "live" as they emerge during the two-year initial training of labour inspectors, a project for the further training of labour inspectors was launched in 2016. In order for labour inspectors to advise and monitor companies and educational establishments competently in consideration of technical developments and changes to the underlying legislation, the knowledge and skills of each individual labour inspector must continually be brought up to date. Modern, forward-thinking further training of their labour inspectors is of great importance to the accident insurance institutions and is addressed by the project. Based upon an understanding of the professional function and the concept for initial training, a concept for further training is to be developed that supports the accident insurance institutions with recommendations and guidance documents during the launching of processes for the further training of labour inspectors. ●

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Jürgen Da Pont,
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THE FUTURE OF IN-PLANT OCCUPATIONAL SAFETY AND HEALTH SUPERVISION

What form should in-plant supervision take in the future? How will it be assured? The “Hennef group” has drawn up proposals for sustainable implementation of DGUV Regulation 2.

The DGUV is pursuing the following objectives in particular in order to assure in-plant supervision in the future:

1. Ensuring provision by an adequate number of skilled personnel.
2. Increasing professional supervision of small companies and of companies in rural areas.
3. Adapting in-plant supervision to the fundamental changes taking place in the world of work.

In the Hennef group, management and the prevention services of the German Social Accident Insurance Institutions have drawn up proposals for how

DGUV Regulation 2 can be implemented adequately. The regulation governs in-plant supervision.

endowment professorships and by improved opportunities for further training.

- To enhance the status of the supplementary qualification in occupational medicine. Further training is to be made possible on a supervised and part-time basis.
- To extend the delegation of tasks that need not necessarily be performed by an occupational physician. The pressure upon occupational physicians should be relieved by auxiliary personnel and by the use of telemedicine.
- To involve further professions in in-plant supervision.
- To introduce a “centre” model.

For each of the last of these modules, the Hennef group has tasked a working group with developing a concept for further development of the module.

PROFESSIONS WORKING GROUP

By the involvement of further professions in the task of supervision, provision of the necessary services to the companies is to be assured, and at the same time the changing requirements for in-plant prevention are to be met. New challenges for example, such as musculoskeletal diseases and mental stresses, require the scope

of supervision to be extended. Relevant professions for in-plant supervision are, in particular, those concerned with occupational and organizational psychology, human factors sciences/ergonomics, occupational hygiene, ergonomics, and the health sciences. Besides their professional skills, the relevant groups must also possess professional experience. Furthermore, the professionals must be equipped with the specific prevention-related skills in the area of safety and health. The working group is setting out criteria for the comparability of the training content and is defining its terms of reference. The necessary coordination of all professions involved is to be assured by the employer; the company work safety committee, constitution of which may be a legal requirement, can support it in this task. The Professions working group presented the detailed concept document to the Prevention Principles Committee (GAP) at the end of 2016, and is currently specifying it further.

THE CENTRE MODEL

A further strategy for assuring supervision of small companies by occupational physicians and OSH professionals is the “centre model”. The detailed concept document considers precise dis-

tribution of resources to be a crucial element: the number of supervised companies and the quality of supervision are to be improved. The occupational medical and safety services (ASDs) of the BGN, BG Verkehr, BG BAU and the German Social Accident Insurance Institution for local authorities in Bavaria have proved very effective and serve as a good practice model. In the centre model, regional centres serving multiple accident insurance institutions would enable service providers licensed by the DGUV to provide tailored

have comprehensive provision in place for supervision of its member companies whilst companies in other sectors are desperately looking for providers. In such cases, the coordinating body can communicate the availability of suitable service providers to the responsible body at the accident insurance institution, or to the companies themselves. At the same time, access to supervision is facilitated: the companies no longer need to find a provider on the open market, but receive offers of supervision from the

can take effect once a reasonable deadline has passed, thereby first giving companies sufficient opportunity to make their own arrangements for occupational medical and safety supervision.

A deadline of at least six months is under consideration. Pricing for services delivered from a central point is also under discussion. In consideration of the current legal situation, a pay-as-you-go system and cost-effective and price-conscious remuneration for the service providers are being considered.



In some regions, a specific accident insurance institution may have comprehensive provision in place for supervision of its member companies whilst companies in other sectors are desperately looking for providers.



services to the companies. These centres would not be limited to a specific supervision model, but would offer all forms of supervision covered by DGUV Regulation 2. This would also benefit companies that are currently supervised either inadequately or not at all.

These services are intended for companies with up to 50 employees. In addition to the existing ASDs, a coordinating body is to be set up at the DGUV. This body would determine the need on a regional basis, and procure services.

COORDINATING BODY

In some regions, a specific accident insurance institution may

coordinating body. Quality is assured by the licensing procedure for the service providers. Better distribution of the services also ensures that the service providers have shorter travel times and thus greater capacity for supervision.

ACCESS

In order to improve access to supervision services, the inclusion of a follow-up procedure in the bylaws is under discussion by means of which all companies with up to 50 employees can be covered by the centre model. In accordance with the Book 7 Section 24 of the German Social Code, (SGB XII) such an arrangement

PILOT PROJECT

The centre model is to be trialled in a pilot project in 2017 and 2018. Cooperation with accident insurance institutions with an existing active ASD and those without such a body is intended to improve provision to the member companies.

The project is also intended to provide indicators of the ideal form to be taken by the individual modules of the project:

- Organization and governance of the centre model
- Licensing method
- Concrete pricing
- Funding
- Follow-on procedure

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In 2016, the responsible bodies at the DGUV discussed the proposals made by the working group. Policymakers, the social partners, service providers and their professional and industry associations were also involved.

The proposals of the Hennef group are as follows:

- To make the task of occupational medicine more attractive. This is to be achieved for example by the funding of



FUTURE PROSPECTS

In order for the quality and scale of occupational medical and safety supervision of the companies to be raised, the measures described by the Hennef group must be closely coordinated. Only in combination will the measures enable the wider objective to be attained.



In order for the quality and scale of occupational medical and safety provision to the companies to be raised, all measures described by the Hennef group must be closely coordinated.



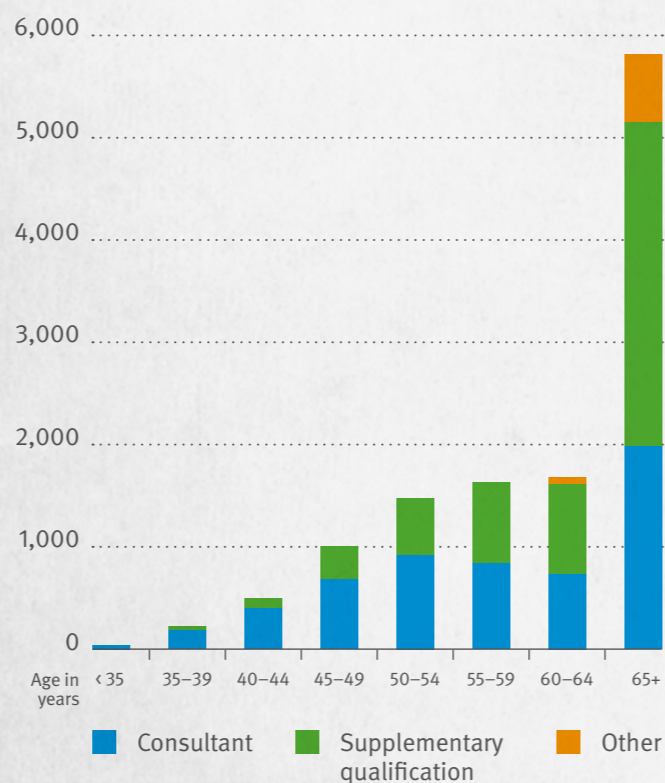
Both the centre model and the involvement of further professions are being developed further and specified with the expertise of the accident insurance institutions, policymakers, social partners, and the relevant associations of service providers. This development is being supported by discussions, including at the Dresden Prevention Forum and discussion of DGUV Regulation 2 among experts in 2017. The stakeholders' assessments are being noted and fed into the process. Discussion will place the reforms on a wider footing and is intended to contribute to the support provided by all parties at the implementation phase. ●

SUPERVISION BY OCCUPATIONAL PHYSICIANS

The number of occupational physicians active in companies is not clear. 12,363 have been accredited; of these, 61% are aged over 60 and will therefore cease to be active in the near future. According to the BAuA study (F 2326) of the need for occupational medical supervision in Germany, implementation of DGUV Regulation 2 is no longer assured. The BAuA study further indicates that around 630 new occupational physicians would have to be accredited each year, rather than somewhat over 200 as is currently the case.

PHYSICIANS WITH OCCUPATIONAL MEDICAL EXPERTISE, BY AGE

n = 12,363, as at 31 December 2015, source: BÄK



Source: Ch. Barth, W. Hamacher, C. Eickholt: Arbeitsmedizinischer Betreuungsbedarf in Deutschland. 1st edition. Dortmund: Bundesanstalt für Arbeitsschutz und Arbeitsmedizin 2014.

THE MOST IMPORTANT TEN

In 2016, a public discussion process launched by the Federal Ministry of Labour and Social Affairs (BMAS) on the subject of Work 4.0 gathered pace. The risk observatory maintained at the IFA contributes factual information on trends in the world of work, researched scientifically, to this discussion process.

Discussion is centred on the main political questions. What changes can be anticipated in an increasingly digitalized world of work? Will there still be enough work for everyone in the future? What effects will the changes have upon the flexibility and further training of workers, upon data security, and upon the definition of social security?

The DGUV has contributed to this debate with comments, consistent with its long history of working systematically on issues of work in the future and the associated challenges for preventive activity. It has placed this research activity on a scientific basis with its own IFA risk observatory.

ISSUES

In 2016, coinciding perfectly with the national discussion of changes in the world of work, the institute was able to name the areas in which preventive activity must be pursued actively in Germany in order for work to be made safe and healthy in the future:

- Intensification of work
- Demographic change
- Digitalization

The risk observatory thus confirms the aspects dominating discussion of "Work 4.0", together with the essential factors influencing safety and health in tomorrow's work. In the future, these trends could in fact place

the concept of "good work" as currently defined by policymakers in Germany in doubt. Proactive prevention activity that monitors and influences these developments is seen to be indispensable.

FITNESS FOR WORK

A further interesting result is that the boundaries between typical accident insurance topics and those of public health appear to be blurring. Sedentary lifestyles outside working hours and unhealthy nutrition have entered the list of the top ten issues for future prevention activity, despite not lying within the core statutory mandate of the German Social Accident Insurance Institutions. These issues nevertheless now have a considerable impact upon the fitness for work of gainfully employed persons and thus constitute a challenge for occupational safety and health.

The most important topics for the future continue to include what might be considered "old chestnuts" such as noise and ergonomic stresses. These topics also illustrate how the risks are changing along with the technologies: the industrial use of ultrasound, for example, requires new measurement methods; innovative prevention concepts are needed to counter the lack of movement resulting from jobs increasingly being performed at VDU workstations.

PREVENTION CONCEPTS

The risk observatory also delivers concepts for forward-thinking preventive activity: it not only explicitly states foci of prevention, down to the level of individual accident insurance institutions and sectors, but also provides concrete proposals for prevention that are geared to reducing "Risks 4.0" to an absolute minimum. As in the past, the preventive activity of tomorrow can contribute effectively to good work only if it delivers workable protective measures for day-to-day application in industry in response to the OSH problems, whether old or new.

The German Social Accident Insurance has already launched this process. The individual German Social Accident Insurance Institutions are able to use the findings from the risk observatory to guide their activities, i.e. to act with specific consideration for the particular needs of the sectors

they insure. At the same time, the institutions' umbrella association launches cross-sector

research projects and training measures with reference to the results obtained by the risk observatory. Examples include studies of the potential applications and OSH risks presented by data goggles or mobile information and communications technology. ●

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THE CHANGING WORLD OF WORK

In 2016, in its series of events entitled "The future of work", the IAG addressed the topic of safety and health against the backdrop of digital change.



▲
▲
A wide range of formats made the IAG event both informative and varied.

Reports of self-driving cars, collaborative robots and networked, intelligent machines appear in the media almost on a daily basis. Digital technology is increasingly impacting upon forms of work, opportunities for education and training, and mobility. The IAG has been examining how changes at the workplace impact upon workers since 2002

in its series of events entitled "The future of work". In 2016, the focus of the event lay upon safety and health in the

era of digital change. Particular consideration was given to the topics of work, transport, and education and training.

THE 4.0 ERA

The following topics were presented and discussed intensively in lectures and fora attended by numerous delegates from the German Social Accident Insurance Institutions, industry, government and the education sector:

- What developments lie ahead in the areas of work, transport, and education and training?
- What opportunities, risks and need for action arise as a result?
- How can the overriding importance attached to safety and health continue to be assured?

Through the lectures, it became clear that the process of digital change has already been underway for some 20 years, but that some changes are relatively new and their effect so great that we can justifiably speak of a new era. The experts made the follow-

ing important comments on the developments:

- We must learn to deal with growing complexity.
- A greater number of (technical) options forces us to make more decisions.
- This freedom is associated with an increase in responsibility, which in many areas must be defined and assigned from scratch.

TRANSPORT 4.0

The individual topics were discussed more closely in the fora of the event. Discussion in the Transport 4.0 forum was characterized by the topics of automation and networking. Many questions have yet to be answered regarding safe self-driving vehicles and control infrastructures. Against the background of growing mobility needs, however, digitalization also presents major opportunities.

EDUCATION 4.0

In the Education 4.0 forum, the topic was how the process of change can be shaped by education and training. A key challenge in this respect will be integral learning within production. This includes, for example, the acquisition of system competence and an understanding of processes, enhancing of decision-making ability, competence in the handling of complexity, and health competence. Each employee should be capable of assessing the safety and health of their own working environment and of acting accordingly. For this purpose, knowledge and experience must be networked and channelled and must be readily available.

WORK 4.0

The fears and hopes and the opportunities and risks asso-

ciated with digitalization were particularly apparent during discussion in the Work 4.0 forum. The conclusion for the future of work was that technical progress has improved many aspects of working life. As a rule, technical inventions have been the drivers of this development, and occupational safety and health and health protection have frequently struggled to keep pace with them. A culture of prevention means that preventive thinking must begin at the very outset of the work design process, and not merely at the end of it.

It also means that in the context of prevention, human beings are to be viewed in terms of their needs and potential rather than their hardships and limits. All individuals with responsibility in this area should work towards safety and

health becoming a part of global corporate thinking. In turn, the planning and action of all parties concerned must become

≡
All individuals should work towards safety and health becoming a part of global corporate thinking.
 ≡

even more complex and forward-thinking than in the past, and they should exploit the opportunities for shaping this process of change. ●

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VISION ZERO



Our aim is for us to join together in creating a world in which no one suffers injury or illness at work, never mind death.



Interview with Hans-Horst Konkolewsky,
Secretary-General of the ISSA

Mr Konkolewsky, the ISSA is planning to launch a world-wide prevention campaign at the World Congress in Singapore, in order to establish the “Vision Zero” for safety and health at work. For the ISSA and in particular for you personally, the Vision Zero has been right at the

The ISSA aims to be a pioneer on this journey, with essential support from its worldwide prevention network and the highly active ISSA members at the DGUV. Our aim is for us to join together in creating a world in which no one suffers injury or illness at work, never mind death.

menting these rules and the explanations of them appropriately and competently at plant level.

Our aim is to motivate ISSA members and to equip them to engage companies in their own countries for Vision Zero and thereby to foster preventive activity.

RAISING AWARENESS FOR RISKS AT WORK

Interview with Hans-Horst Konkolewsky,
Secretary-General of the ISSA

top of the agenda, particularly since the 2014 World Congress in Frankfurt. Is a world without a single fatal occupational accident or disease realistic? Vision Zero is not a numerical target, but a philosophy – a strategy by which the actual target is to be attained, namely the creation of a culture of prevention that brings us closer to the Vision Zero.

Vision Zero has four important principles. Human life is not negotiable; every occupational accident and occupational disease is avoidable; prevention is the instrument for entrepreneurial success; and finally, Vision Zero is the key to development of a global culture of prevention at the workplace.

How do you aim to achieve this?

We want to help to raise awareness for risks to life and health at work. We want to work towards safety and health always being an integral element of work itself. Many risks can be reduced to the extent that serious accidents resulting in injury, permanent harm or death no longer occur. With the “seven golden rules”, we are taking a pragmatic approach. These rules cover all aspects of a successful prevention strategy and can be applied in companies of any size.

In our prevention campaign, we are attaching particular importance to the commitment by all parties involved to imple-

What does this mean, in practice? Can you provide an example?

For the topic of “leadership”, for example, this means making safety and health at work the first item on the agenda at all management meetings. This must apply to all levels of company management – i.e. including top management!

And whilst we’re on the subject of leadership: anyone who has taken up the cause of Vision Zero needs a good plan with realistic milestones. This means that what has been achieved so far must be reviewed regularly against firm quantitative intermediate targets. An example would be the reduction of reportable accidents by

one percentage point within a realistic timeframe. If necessary, adjustments must be made and measures stepped up should the target not be met.

How can a company begin employing Vision Zero as a prevention strategy?

The starting-point is of course careful analysis of the status quo regarding the incidence and severity of accidents and diseases in the company. In consideration of the company’s future commercial orientation, which may involve new risks, starting-points for areas requiring intervention can then be identified. If the company does not possess the expertise required for this task internally, it must call upon external experts.

What support is provided by the ISSA?

Many of our ISSA member organizations can serve as the first port of call for companies. Our strategic vision is to promote dynamic social security as the social dimension in a globalizing world by supporting excellence in social security administration. In its Innovative Centre for Excellence in Social Security, the ISSA has drawn up numerous prevention guidelines for its members on a range of topics. ISSA members can also receive dedicated training in the use of these guidelines. For the area of safety and health at work in particular, guidelines are available on workplace preventive activity and workplace health promotion.

FOUR IMPORTANT PRINCIPLES

1.
Human life is not negotiable
2.
Every occupational accident and occupational disease is avoidable
3.
Prevention is the instrument for entrepreneurial success
4.
Vision Zero is the key to development of a global culture of prevention at the workplace



What role should Vision Zero have here?

Our aim with the Vision Zero initiative is to enhance the ISSA's provision of support and advice to its members and to make this provision better known. The ISSA will contribute to this by establishing Vision Zero in its worldwide network of 340 members in 158 countries. When we speak with one voice – and the DGVV and many of its members have been committed to Vision Zero now for almost ten years – we will enhance safety and health at work decisively.

What preparations are being made for the launch of the planned Vision Zero campaign?

We are currently developing three tools. Firstly, a Vision Zero guide containing a questionnaire introducing the subject. Secondly, a Vision Zero website. And thirdly, a Vision Zero training compendium. These tools, which will be made available free of charge in a number of languages, form the basis of our campaign.

One of the first practical aspects of the campaign will be publicity for the “seven golden

rules” of Vision Zero, to which suitable content is yet to be added for the various sectors. We are particularly aiming at top and middle management as the target group, with a view to their leading by example and thereby establishing a culture of prevention by serving as role models and by virtue of their decision-making competence in their companies.

We also aim to propagate Vision Zero and the associated activities by intensive networking on all levels with the occupational safety and health community worldwide, for example through conferences and industry events. Practical training courses on the “seven golden rules” are also planned, as are activities on social media channels such as Twitter and professional portals such as LinkedIn.

Intensive support for and in some cases steering of the development and delivery of these measures by the ISSA Sections for Prevention are crucial and indispensable for this purpose. The concentration of expertise and worldwide networking of the majority of countries in the world through the 13 ISSA Sections for

Prevention under the leadership of the Special Commission on Prevention provide the technical knowledge underpinning implementation of the ISSA's global Vision Zero campaign.

Besides the international Sections for Prevention and their members, are other international players also supporting the Vision Zero initiative?

The concept of a Vision Zero campaign for occupational safety and health was presented for the first time six years ago at the XX World Congress in Istanbul. Three years later, at the World Congress in Frankfurt organized by the DGVV, Andrea Nahles, German Minister of Labour and Social Affairs, and Guy Ryder, Director-General of the ILO, announced the creation of a Vision Zero fund for the purpose of improving working conditions in supply chains, such as in textile factories in Bangladesh, Pakistan or Ethiopia. The ISSA will be working closely with the fund, since it serves as a strong partner with which we can take Vision Zero into countries in which occupational safety and health does not yet enjoy the same priority as in Europe. ●

A LODESTAR FOR A CULTURE OF PREVENTION

How can Vision Zero be made a reality? The 4th International Strategy Conference in Dresden underlined the strategic importance of Vision Zero for development of a worldwide culture of prevention.

In consideration of the major significance of this strategy for policy, the 4th International Strategy Conference was launched with the Vision Zero. Pete Kines of the Danish National Research Centre for the Working Environment began by clarifying the term: the zero, he stated, does not represent a statistical target, but a strategy and process by which all accidents and occupational diseases can be prevented.

STRUCTURE

The structural framework for implementation of the Vision Zero concept was explained by Helmut Ehnes from the BG RCI. He presented the ISSA's Vision Zero guidelines: “seven golden rules” for implementation of the strategy. At the operational level, technical measures are however less crucial than an individual commitment by management personnel and workers to putting Vision Zero into practice, according to Steve Hails from Crossrail Ltd., Great Britain. Shelley Frost of the Institution of Occupational Safety and Health (IOSH), which is active throughout the world, drew attention to the significant role played in this context by education and training. Finally, the speakers discussed what is needed most urgently for implementation of the next step in the Vision Zero strategy. The two essential factors are:

1. INTERNATIONAL INDICATORS

To permit systematic monitoring of the process for development of a culture of prevention and to demonstrate the success of the Vision Zero strategy's implementation

2. IMPROVED COORDINATION

Of national and international OSH strategies under the guiding strategy of Vision Zero

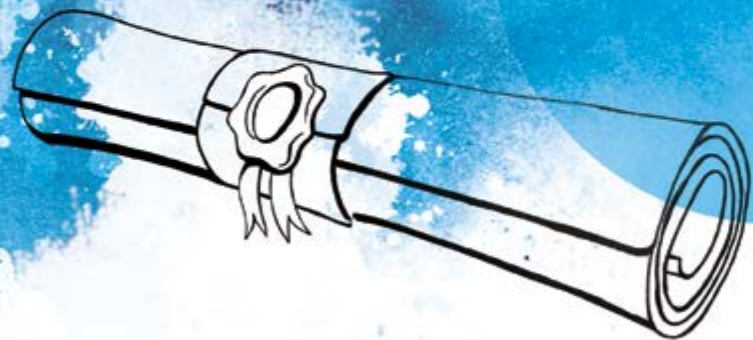
WORLD CONGRESS

As in 2013, the 4th International Strategy Conference held in 2016 was a milestone for the Global Forum for Prevention. The upcoming World Congress on Safety and Health at Work will be held in Singapore from 3 to 6 September 2017. The congress will show whether the two objectives formulated in Dresden have been achieved and whether it has been possible, by collectively following the “lodestar” of Vision Zero, to make progress in development of a culture of prevention in the various regions of the world. ●

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The fourth International Strategy Conference provided opportunities for discussion. Here: Dr Walter Eichendorf, DGVV





QUALIFICATIONS UNDER TEST

▲ SCC is a specific management system for contractors in the sphere of safety, health and the environment. SCC is a certification system that has been in demand for many years.

Certification is increasingly being applied to individuals. Many companies take advantage of the services offered by the German Social Accident Insurance in order to obtain a certificate of their employees' competence in occupational safety and health. With over 1,500 certificates issued, the number increased in 2016 by almost 70 %.

SECTOR ORIENTATION

An SCC* personnel certification body was established in the DGUV Test test and certification system in 2015. Initially launched with three certification sections, it was extended by a further section in 2016 and now covers sectors of member companies that exhibit a high risk and incidence of accidents. The sections are maintained at the German Social Accident Insurance Institutions for the transport industry (BG Verkehr), the energy, textile, electrical and media products sectors (BG ETEM), the building trade (BG BAU) and the woodworking and metalworking industries

(BGHM). The accident insurance institutions conduct training on their own account: the participants are therefore able to have one-to-one discussions of practical relevance with experienced lecturers from their own sectors, as equals.

A welcome side-effect of this arrangement is that long-term links are often forged between the contacts at the accident insurance institution and the management personnel within the company. ●

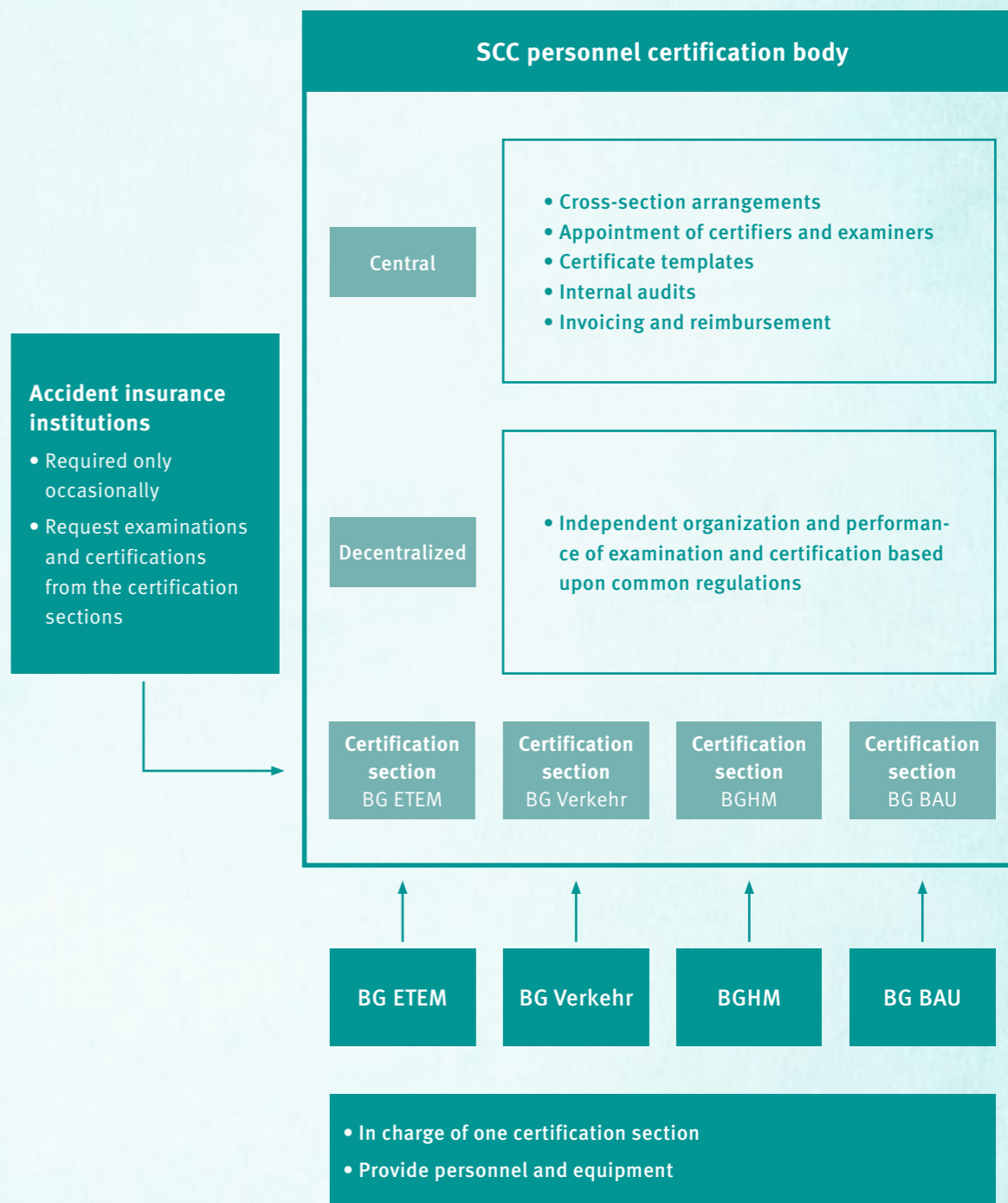
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Web link Further information on SCC on the DGUV Test website: www.dguv.de/dguv-test/scc

≈
The SCC personnel certification body implements a common quality management system across the four decentralized certification sections.
 ≈

* SCC: Safety Certificate for Contractors

SETUP OF THE SCC PERSONNEL CERTIFICATION BODY



Source: DGUV

AN INDEX FOR PREVENTION

The prevention index is a tool developed by the BGHM for rating the safety level in companies. It comprehensively measures the standard of occupational safety and health in a given company. The prevention index has proved simple to apply and reliable to use in the field.

The PITOP prevention index can be used by the responsible labour inspector to audit a company site. Rating follows the TOP principle of in-plant prevention practice, i.e. the ranking of technical, organizational and personal aspects. Four key questions apply to each aspect. Comprehension is facilitated by explanations that can be adapted to a specific sector.

RELIABILITY

As part of their joint project on accident epidemiology, experts from the DGUV and the BGHM determined the reliability of PITOP. The procedure they followed involved two labour inspectors auditing a total of 135 companies simultaneously and independently and rating them by means of PITOP. The workforces of the companies varied in size between 20 and 500 insured individuals. The ratings were found to correlate with statistical significance.

The reliability of PITOP was thus demonstrated.

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INTERNAL VALIDITY

IFA experts also examined whether the postulated division into the aspects of technology, organization and person is advantageous. A factor analysis in which statistical and empirical methods were used to group issues revealed that the three aspects were observable in three clearly distinct groups. The distinction according to "TOP" is therefore empirically demonstrable and meaningful.

VALIDITY OF THE CONTENT

Finally, the experts examined whether PITOP is suitable for the prediction of work-related health hazards. For this purpose, they determined the relationship between the PITOP values and the five-year average accident rate. Analysis of the results revealed a clear relationship between PITOP value and accident rate: companies with a good PITOP rating also had lower accident rates. PITOP therefore demonstrably covers content that is relevant to the causes of accidents.

PITOP

- Permits a valid evaluation of plant safety
- Can be used for hazard-based selection of companies and parts of companies requiring auditing
- Can be used to detect company-specific safety deficits in comparisons between companies
- Can be used to develop prevention concepts (consulting, training) specific to companies
- Can be used to reduce the overhead required for the planning and conducting of data surveys in work programmes and campaigns
- Can be used for selective planning of in-plant prevention measures ●

TRAFFIC SIMULATION FOR THERAPEUTIC PURPOSES

Anyone who has been involved in a traffic accident is at risk of developing post-traumatic stress disorder. In some cases, the consequences of the accident lead to a chronic fear of driving. The use of traffic simulation as part of therapy may be effective.

Almost half of traffic accident victims exhibit symptoms of stress within the first few weeks following the accident. Of these, approximately eight percent later suffer post-traumatic stress disorder (PTSD). A further 30 percent develop other mental disorders such as adjustment disorders or specific phobias. These late consequences of the accident may lead to sustained fear of driving, as the case of a nurse shows.

CASE STUDY

Whilst travelling home after the end of her shift, a nurse was involved in an accident with a car driven by a drunk driver and travelling on the wrong side of the road. The nurse suffered serious injuries as a result. Three years after the accident, the patient was still suffering from flashbacks triggered primarily by flashing blue lights and sirens – a recollection of the emergency service vehicles on the evening of the accident.

The patient had already been receiving in-patient treatment for PTSD for several months with little prospect of success when the option of traffic simulation therapy arose. This therapy was possible through the programme of simulator training on emergency vehicles offered by the DVR at the IAG, and involved placing the patient in a virtual traffic environment. The SILAB simulation software enabled her to be subjected to stress in a very controlled manner and in stages. Impulse reactions were addressed deliberately and translated into safe behaviour that could then be trained. After four sessions within three weeks, the patient was sufficiently stabilized to be able to cope with real traffic and to resume work.

The outcome of this therapeutic application of traffic simulation was that confrontation was found to be very effective in supporting cognitive behavioural therapy. Since this successful outcome in 2013, the IAG's driving simulator has been used in support of therapeutic treatment, particularly for professional drivers, and in some cases has proved highly effective. The procedure has considerable therapeutic potential.

In order to validate the findings systematically and to develop them further, the IAG has involved trauma and anxiety researchers.

A project was conducted in conjunction with partner bodies with many years' experience in the use of virtual reality for therapeutic purposes, specifically the WIVW Center for Traffic Sciences in Würzburg (WIVW GmbH) and the University of Würzburg (out-patient department of the university hospital for psychotherapy, department of psychology I). In conjunction with the BG Verkehr, research was begun into the efficacy of the traffic simulation largely in isolation and with DGUV funding. Results will be available in the second half of 2017.

FUTURE PROSPECTS

In future, the task will be to develop a therapeutic procedure involving traffic simulation that not only reduces the duration of treatment, but also trains the patients in readiness for stressful traffic situations, and as a by-product also increases their safety road safety in general. ●

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Web link Project description on the website of the Center for Traffic Sciences in Würzburg (WIVW):
www.wivw.de ► SILAB

PREVENTION AT SOURCE

The test and certification services are prevention services that take effect directly at the source: at the manufacturer. They take safety and the protection of health into consideration before products even reach the member companies. The paper on prevention at source and product testing and certification describes this illustratively.

The bodies in the DGUV Test testing and certification system focus upon areas with a high incidence and severity of accidents and fatal hazards, and thus make a valuable contribution to prevention. The importance

of this can be seen from the fact that 40% of the products are found to be defective in the first test. Since manufacturers of many product types

are not obliged to have such tests conducted, defective products appear on the market and in companies. The tests conducted reveal such defects, thereby contributing to the prevention of accidents and health hazards.

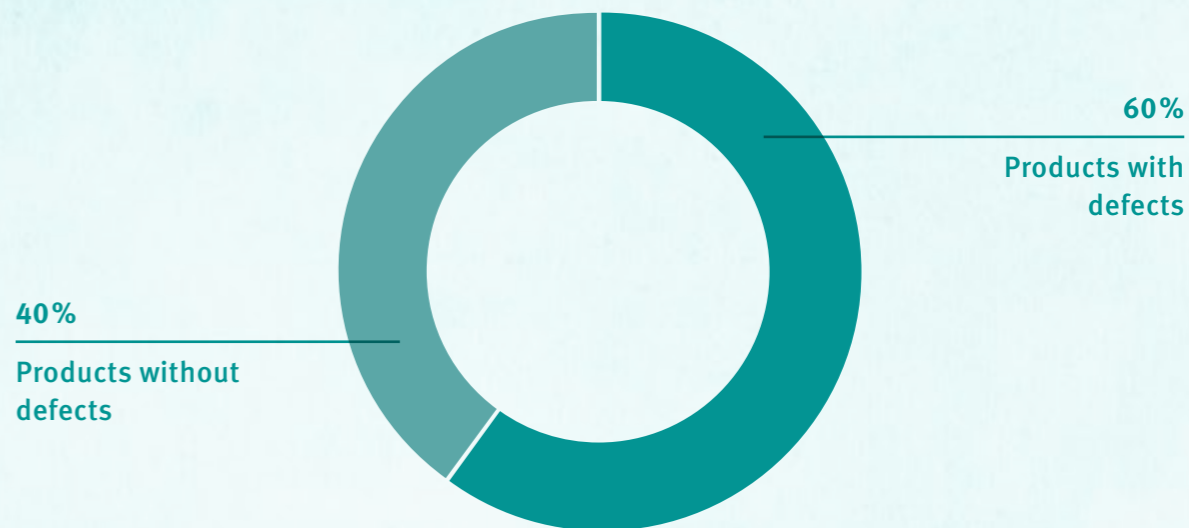
AN ALL-ENCOMPASSING APPROACH

The primarily technical approach to testing and certification taken in the past is of crucial importance. This also applies to more recent technologies such as collaborative robots. Increasingly, the technical aspect is being accompanied by mental aspects. For example, a human being must not be injured by a robot, but nor must he or she suffer mental strain through working with such systems. An all-encompassing approach means that mental stresses must also be considered as well as physical stresses, for example during the design of machinery. In this context, the certification and testing experts work closely with their colleagues in research and standardization. The findings obtained during testing and certification serve in turn as input for other prevention services. Both of themselves and in combination with surveillance and consulting, they form a control loop that facilitates safer and healthier products. ●

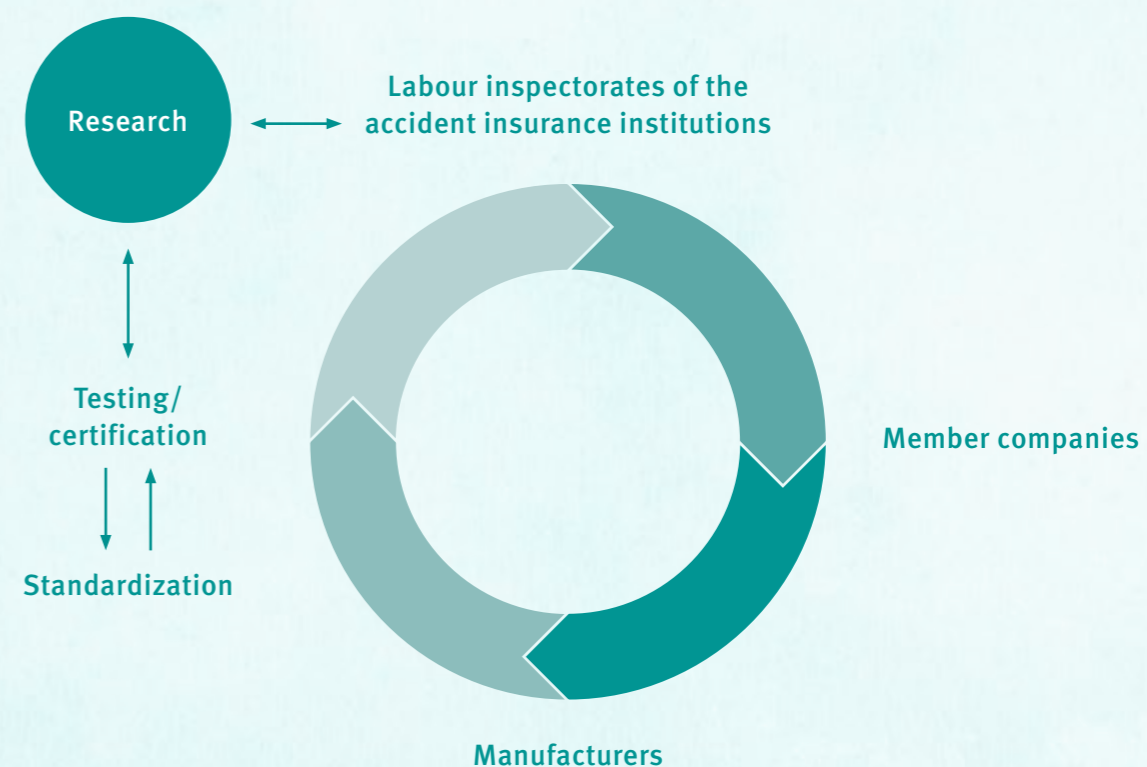
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Web link Paper on prevention at source and product testing and certification: www.dguv.de, Webcode: m1225310 (only available in German)

PROPORTION OF DEFECTIVE PRODUCTS AT THE FIRST TEST



INTERFACES BETWEEN TESTING AND CERTIFICATION AND OTHER PREVENTION SERVICES



Source: DGUV Test

GLOBAL CAMPAIGN

The social and economic losses resulting from unsafe and unhealthy conditions at work are significant. The ISSA is reacting to this situation with a global prevention campaign, which will be launched with the support of the DGUV at the World Congress 2017 in Singapore.

Globalization and financial crises have had a far-reaching impact upon the world of work, and are an obstruction to worldwide prevention activity.

To counter this trend, the ISSA is stepping up the support for workplace safety

and health measures that it has provided successfully for decades by launching a global prevention campaign. The German Social Accident Insurance will lend

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strong support to this initiative, just as it has supported numerous international occupational safety and health activities in the past. The World Congress on Safety and Health at Work 2017 in Singapore will mark the launch of the global prevention campaign with the leitmotif "Vision Zero – a world without fatal and severe occupational accidents, occupational diseases and road accidents is possible".

The Vision Zero concept has been an element of the DGUV's work for many years. Vision Zero does not imply a numeric target achievable in the foreseeable future, but is the underlying strategy of a holistic prevention culture that considers the safety, health and well-being of workers in all economic activity. Vision Zero was anchored in the prevention strategy of the German Social Accident Insurance as long ago as 2008. In accordance with this strategy, working and living environments are to be designed such that in the future, no one will be killed, or injured or suffer illness of occupational origin so severely as to suffer harm. Vision Zero was already the motto of the World Congress organized in Frankfurt by the DGUV in 2014.

MAXIMS

Experience has shown that the majority of risks can be reduced to a level at which severe accidents resulting in injuries, permanent harm or death can be avoided. The campaign aims at generating a strong awareness of risks at work to life and health. Measures for safety and health are to form an integral part of the planning and performance of work in companies, institutions and organizations.

In order for Vision Zero to become reality, prevention activity must continually be realigned to this target. This broad-based and networked approach requires the participation of all players in society. Under Vision Zero, safe and healthy work is regarded as a basic right. All actions in society and within companies are geared to developing a culture of prevention.

The essential maxims of Vision Zero are:

- Human life is non-negotiable.
- Human beings make mistakes.
- The absolute tolerances are the physical and mental load limits of human beings.
- Human beings have a basic right to a safe working environment.

MOBILIZATION

The strategy has the support of all major international organizations. The ILO is managing a Vision Zero fund for the promotion of safety and health in newly industrialized countries such as Ethiopia, Bangladesh and Myanmar. The decision to establish the fund was taken by the governments of the G7, the association of the seven economically most significant developed countries at the time, at the suggestion of the German government.

SEVEN GOLDEN RULES

1. Leadership commitment
2. Identify all hazards and risks
3. Set safety and health targets
4. Ensure a safe system
5. Use safe and healthy technology
6. Improve qualification
7. Involve people

The global Vision Zero campaign is intended to mobilize decision-makers in companies and OSH experts worldwide for implementation of the fundamental principles of the Vision Zero strategy. The campaign thus extends the efforts made by the ISSA over many decades in the interests of safer and healthier workplaces throughout the world. It is being coordinated by the General Secretariat of the International Social Security Association in Geneva based upon an integrated concept, and is being pursued as a long-term, continual process.

SEVEN GOLDEN RULES

The seven golden rules cover all essential aspects of a successful prevention strategy for companies and institutions. They are simple, and suitable for implementation by companies of any size. The target groups addressed by the campaign in the first phase are employers, management personnel and disseminators. They are suitably equipped by the campaign to win companies in their countries over to the concept of Vision Zero. Those involved require a comprehensive plan for development of a sustainable occupational safety and health culture that is supported by concrete measures and milestones, and that is to be reviewed at regular intervals.

VISION ZERO PORTAL

A website will form the core element of the campaign, supplemented by an app. Its content extends from explanations and tools, through the concepts of Vision Zero training, to the campaign materials. Links to further information will show how the seven golden rules can be implemented in specific sectors and for specific tasks. With its global Vision Zero campaign, the ISSA is relying strongly upon the support of the German Social Accident Insurance Institutions with their specialist expertise and international experience. ●

Up to 2.3 million workers die every year as a result of occupational accidents and diseases. Around 160 million people suffer from the effects of non-fatal occupational diseases, and up to 313 million suffer occupational accidents with non-fatal consequences. (ILO estimates)

ROAD SAFETY

Vision Zero pursues the objective that no one should be killed or seriously injured. Not only at work, but also on the roads. Prevention experts and researchers are contributing important observations in this area.

Highly automated or fully automatic driving: everyone wants it, and it appears unstoppable. Driver assistance systems such as anti-lock braking (ABS), accident detection systems in airbags, and braking and lane departure warning systems: these systems and many others like them are already in use. Driving tasks will be assumed to an even greater degree by the systems of the future. These systems will increasingly take decisions themselves, always in accordance with a program. This also applies when a collision is unavoidable and the system must decide which persons involved in the accident may be injured.

Owing to inattentiveness on the part of a non-automated road user, a car must either avoid a pedestrian and damage an uninvolved vehicle, or risk killing the pedestrian. In the workshop, prevention experts produced risk assessments for the use of automated vehicles in road traffic. These showed that the high demands placed upon technology, the organization of mobility and decisions taken by people cannot yet be fully addressed. A key question must first be answered, namely: how long does it take a person to react adequately when he or she must assume control in a hazard situation? This question is currently being studied by the IAG on a dynamic driving simulator in cooperation with Dresden Technical University.

DISTRACTION

A driver who texts manually whilst at the wheel is placing him or herself and others in danger. That much would appear to be clear. In this situation, the driver's gaze and attention are upon the smartphone rather than the traffic. Is this still the case though when the text is entered by voice control? Since their hands are free, are drivers then on the safe side?

The IAG examined the issue in an experimental study. Test subjects steered a car in a simulator and were required to complete additional tasks at the same time:

1. Reading a text message on their own smartphones and replying to it manually
2. Listening to the messages on a voice recognition app – comparable to a hands-free device – and replying to them

The test subjects' performance was measured in terms of lane deviation, and the subjective strain by means of physiological parameters such as the heart rate. Drivers were observed to expose themselves to an elevated risk even when the text

messages were received and sent by means of a voice recognition app. Lane deviation and subjective strain rose significantly; as anticipated, the increase was greater during manual than voice-controlled operation. The German road traffic regulations generally prohibit drivers of vehicles from operating a mobile phone when it must be picked up or held in the hand. However, since distraction occurs even when voice control is used, drivers should not use devices such as smartphones whilst driving, in the interests of their own safety. This is not only safer, but also makes driving more relaxing.

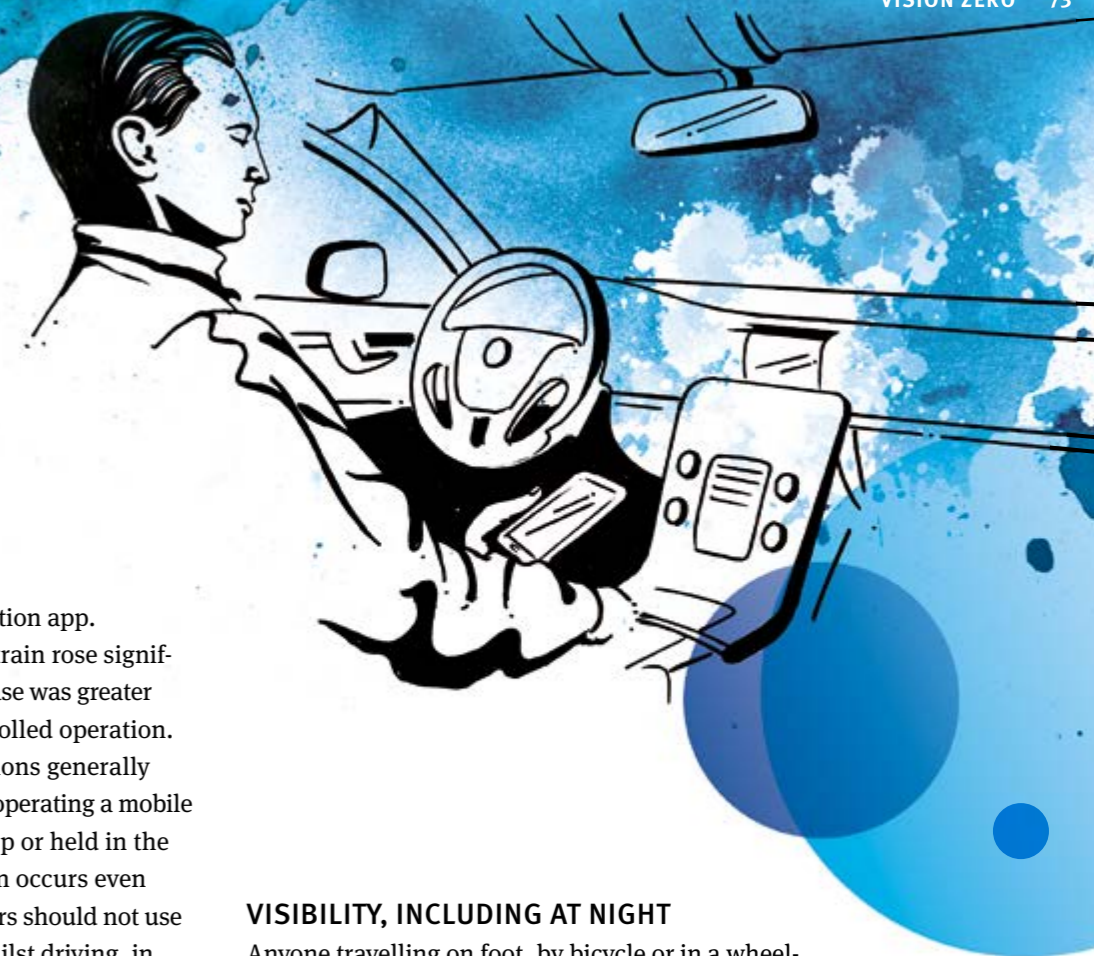
ACCIDENTS DURING TURNING OFF

The majority of fatalities suffered in Germany by cyclists and pedestrians in accidents involving trucks over 7.5 tons occur when the truck is turning right, i. e. to the nearside (almost 90% of cases from 2008 to 2012 in four of the German federal states). The BG Verkehr, IFA and IAG have studied whether CCTV systems could assist in preventing such accidents.

The following questions were addressed:

- Can CCTV systems supplementing the mirrors improve visibility adjacent to the vehicle, or does their use possibly even create an additional hazard?
- What is drivers' assessment of the accident hazard during turning off and of the use of CCTVs for such manoeuvres?
- What criteria can be applied by the member companies of the BG Verkehr to select CCTVs?

The researchers considered the characteristics of existing systems, requirements formulated in standards and regulations, and the results of research and accident investigations. Surveys of drivers also yielded a clear recommendation for the use of CCTVs.



VISIBILITY, INCLUDING AT NIGHT

Anyone travelling on foot, by bicycle or in a wheelchair on roads or cycle paths can be classified as a weaker road user with an elevated risk of being seriously injured in the event of collision with a vehicle. Weaker road users wishing to be clearly visible from all sides to car drivers in the dark should wear retroreflective elements well distributed over their clothing. Several studies by the IFA confirm the efficacy of these elements: retroreflective materials increase visibility at dusk and in darkness. Incident light, for example from car headlights, is reflected directly back. Studies show that persons wearing these materials on their clothing are visible up to 150 metres away in the beams of dipped headlights.

Survey results from the DGUV's "Fight the risk" prevention campaign show that up to the end of primary-school age, children have a positive view of these clothing elements. Teenagers however reject them for fashion reasons. A change in attitude has been observed since the campaign was run: clothing and accessories bearing retroreflective strips are now also increasingly being worn by teenage cyclists.

The DGUV has been addressing the topic of visibility for some years: firstly the retention of and greater acceptance for standardized school satchels, and secondly the use of learning modules for the upper grades of senior school in order to involve young people in the design of wearable and easily visible leisure clothing. ●

▲ Trucks turning off to the nearside frequently endanger other road users

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Web link Information from the BG Verkehr on accidents during turning off: www.bg-verkehr.de, Webcode:16843743

ETHICS

The automation of this decision raises ethical questions that were addressed at the DVR's forum in

June 2016 on the subject of safety and mobility – automated driving and ethics. Such questions are:

- Can we – and indeed do we want to – entrust a machine with taking moral decisions?
- Are the underlying value systems upon which the decisions are based internationally compatible?

Dr Walter Eichendorf, President of the DVR, stated in his closing address that it is still too early to answer these questions. He welcomed the discussion and called for the German Ethics Council to be involved.

In the "Traffic 4.0" forum at the two-day event held in Dresden under the heading "Future of work", these challenges for ethics and prevention were taken up with reference to a classic dilemma.

ZERO ACCIDENT VISION

In the international joint project under the heading “Zero Accident Vision”, companies share their practical experience in implementing the vision of accidents being reduced to zero. They report real success in accident prevention, and positive effects, both internal and external.

More and more companies in a number of European countries are making a long-term commitment to a zero accident vision (ZAV) in order to prevent all severe accidents. In Germany,

too, numerous companies are already gaining experience in implementing a ZAV in practice. With the support of the DGUV, occupational safety and health institu-

tions in seven European countries examined factors for success, challenges and examples of good practice for long-term implementation of this vision. Surveys, interviews and workshops were held at a total of 27 companies

in the international joint project. Potential factors for success were identified from around 8,800 questionnaires, of which just over a fifth came from Germany. The responses revealed possible relationships between a ZAV and the factors of commitment, communication, safety culture and learning. Personnel at companies evaluated the results in interviews and workshops, and shared examples of good practice.

FACTORS FOR SUCCESS

Employees at the German companies involved took a positive view of the ZAV. They considered it particularly constructive for a commitment to a ZAV to be integrated into the company vision. It was seen to be conducive to implementation when management accorded high priority to safety during day-to-day operations and

included near accidents in analyses. Participants named regular activities on all levels and binding measures for improving safety as examples of good practice. It was important in their view for the employees to have the opportunity to participate actively. Training should be geared to specific, safe action at the workers’ workplaces.

Effects of the ZAV were:

- Reduced accident rates
- A positive public image
- Close discussion of accident prevention with business associates
- More routine integration of safe behaviour into workers work processes

STRATEGY

The companies have integrated their ZAVs into their targets. They develop strategies and practices

for a long-term, continual process. A ZAV is shown to change and extend the perspective of traditional safety management. It may also have a positive influence upon the situation in companies with regard to health issues. Some companies are already rising to the challenge of extending a ZAV to a vision of “zero harm” and thus to encompassing health at the workplace, with promising prospects.

SUPPORT

The German Social Accident Insurance Institutions support companies in introducing and implementing a ZAV by providing information and advice. A number of companies are already engaging in regular discussion, including in the Zero Accident Forum, in which they learn from each other how to reduce accidents to zero. ●

Introduction of a ZAV is also able to have a positive influence upon the situation in companies with regard to health issues.

Traditional “accident prevention” safety management	Zero accident vision: the target of zero accidents
The target of reducing accidents to zero is unrealistic in absolute terms	Zero accidents is an ambition – a journey
The aim is to prevent accidents	The aim is to create and assure safety
Safety is essentially a tactical and corporate challenge	Safety is a strategic challenge
Benchmarking with lagging indicators (e.g. lost working days)	Benchmarking with leading indicators (e.g. examples of good practice)
Safety is an independent unit of company organization	Safety is an integral component of entrepreneurial activity
Safety is conceived or required by experts	Safety is shaped by anyone in a company who is willing to learn

TOMORROW'S OCCUPATIONAL SAFETY AND HEALTH

The Joint German OSH Strategy (GDA) is rising to the challenges of the “new world of work”.

The world of work is undergoing constant change as a result of digitalization, globalization, demographic change and growing flexibilization. New forms of work, technological develop-

ments of “Industry 4.0”, and increasing networking are giving rise to a constant stream of new challenges – not least for

preventive activity. The requirements placed upon players in occupational safety and health are also changing as a result.

Against this background, the 11th National OSH Forum posed the following questions:

- What specific requirements are changing?
- What skills must be possessed by individuals involved in occupational safety and health?
- How must they think and act?
- What forms of organization are effective?
- What tools are required?

DISCUSSION

With its broad-based discussion of specialist issues, the National OSH Forum serves to support the targets and programmes of the GDA. Experts met for discussion

on 26 and 27 September 2016 at the DGUV Congress conference centre in Dresden, and turned their attention to the future of individuals involved in occupational safety and health. Under the event heading “Think Outside The Box”, approximately 180 delegates conducted discussions before formulating perspectives and strategies for solutions. The new group format motivated the delegates to participate in the specialist discussions, which were visualized professionally. The results of the National OSH Forum are fed via the National Occupational Safety and Health Conference (NAK) into the GDA. The German national and regional governments and social insurance institutions are using this collaborative structure to accomplish the targets set for the second term of the GDA from 2013 to 2018.

The three current work programmes of the Joint German OSH Strategy are:

1. ORGA: Improvements in the organization of occupational safety and health
2. MSD: Reduction of work-related health hazards and musculoskeletal diseases
3. PSYCHE: Protection and enhancing of health under work-related mental stress

THREE CURRENT WORK PROGRAMMES

ORGA
Improvements in the
organization of
occupational safety
and health

MSE
Reduction of
work-related health
hazards and
musculoskeletal
diseases

PSYCHE
Protection and
enhancing of health
under work-related
mental stress

New measures and products developed in the GDA raise awareness among individuals involved in occupational safety and health for the topics of the work programmes, and communicate associated knowledge and skills. Besides site visits and consulting, the portfolio includes specialist conferences, seminar modules, brochures, guidance documents and explanatory films. These resources can all be found on the GDA website.

GDA-ORGACHECK

A particularly successful product of the GDA's ORGA work programme is GDA-ORGACheck. With this instrument, smaller and medium-sized enterprises can evaluate and improve their own OSH organization themselves with reference to a checklist. The essential strategies and considerations have also met with international approval: for example, they have been adopted in the “Vision Zero” global prevention strategy of the ISSA and the “Seven Golden Rules” at plant level.

FUTURE PROSPECTS

The supporting parties to the GDA strategy continually rise to the challenges presented by new worlds of work. It is already clear that the topics of MSDs and mental issues, which will remain relevant in the future, will continue to be addressed beyond the term ending in 2018 as part of the GDA's third term, which will support the parties to occupational safety and health within plants in addressing these issues. ●



◀ The 12th National OSH Forum will be held in Hamburg on 26 and 27 September 2017 under the oversight of the German regional governments. The future perspective on occupational safety and health will be updated and substantiated.

Standardization



The mission of the German Standardization Strategy: to serve the economy and society by strengthening and shaping regional and global markets and facilitating access to them.



Interview with Dr Albert Dürr,
President of DIN

STANDARDIZATION PURSUES THE OBJECTIVE OF PROTECTING HUMAN BEINGS

Interview with Dr Albert Dürr,
President of DIN

In the past year, DIN has developed a new standardization strategy with the involvement of all stakeholders. What was the reason for this strategy, and what is its objective?

The mission of the German Standardization Strategy is for standardization in Germany to serve the economy and society by strengthening and shaping regional and global markets and facilitating access to them. In order to fulfil this mission, we must regularly adapt the German Standardization Strategy to changing circumstances. DIN has launched a revision of the strategy. We have asked all stakeholders to present their requirements in an open process. The stakeholders in this context are trade and industry, consumers, government and the research community. They have reached agreement on this joint standardization strategy through a transparent process.

Are occupational safety and health and health protection a topic for standardization?

The answer is a resounding “yes”. Standardization pursues the objective of protecting human beings in the areas of health, work, leisure and the environment. It reduces risks for users, and enhances safety. Further objectives are rationalization, quality assurance, clarity of communication, innovation and globalization. Occupational safety and health is reflected above all in the preventive safety requirements for machines and processes and personal protective equipment. These requirements are coordinated by the DIN Commission on Safety Engineering. In the area of health protection, coordination takes place in the DIN Commission on Health. The affected DIN standards committees, such as Medicine, Rescue Services and Hospital, Radiology, Optics and Precision, and also the area of

medicine at the DKE, are represented in this commission, as are the primary stakeholders.

What about standardization of the safety and health of workers at work?

In order to prevent gaps and overlap between standards and the body of statutory regulations, the Commission for Occupational Health and Safety and Standardization (KAN) project was founded by the BMAS and the DGUV, in addition to the DIN Commission on Safety Engineering. Current agreements between the BMAS, the German Social Accident Insurance Institutions and DIN set out the relationship between the bodies of regulations. Subject to the agreement of all stakeholders in OSH, topics concerning the safety and health of workers at work may also feed into standardization activity. This enables the high standards of safety for

workers at work in Germany to be harmonized in Europe and worldwide. In the interests of protecting the working population, this approach is also favoured by some stakeholders for other rules and regulations in the context of globalization.

Enhanced efficiency in standardization: the time allowed for the development of standards is to be reduced. What is your response to objections that reducing the time allowed for development of standards could impact negatively on their quality and on the requirement for all relevant stakeholders to be involved in their development?

We particularly expect harmonized planning and transparent project management during the development of standards to result in reduced development times. Besides our own processes, we have also examined the interfaces

to European and international standardization activity and have lobbied for the relevant processes to be shortened, for example at the voting and public enquiry stages at CEN and ISO. The quality of the standards' content and its freedom from errors continue to be our highest priority.

Are DIN standards on paper and in PDF format still appropriate in this day and age?

Our stakeholders expect the content of standards to lend itself to swift and flexible use. The DIN Group has therefore worked hard on producing the content of standards and specifications in a medium-neutral and uniform basic format, for which an XML format has been adopted. The formats taken by the products, not only at present but also and in particular in the future, can be generated from this XML format. This includes standards content

that can be read and implemented directly by machines.

One final question: will standards be made available to everyone free of charge in the future?

By purchasing standards, users support standardization activity, which is organized by the private sector. Besides drafting the texts of the standards, DIN's work includes ensuring that the body of standards as a whole is free of duplication, that it is harmonized with European and international standards, and that standards are reviewed continually for their consistency with the current state of technical and scientific progress. The costs entailed by this work are passed on to the users who derive benefit from using the standards. Trade and industry itself therefore regulates which standards are in line with the market requirements. In our view, this arrangement is fair. ●

Product instructions frequently exclude persons with sensory, physical or cognitive impairments from using the product for safety reasons, or require them to use it under supervision. How can these requirements be reconciled with the UN Convention on the Rights of Persons with Disabilities (UN CRPD)? The convention pursues the objective of equality for persons with disabilities by formulating and specifying human rights applicable to all persons. This includes the right to access the world of work. The UN CRPD sets out binding rules governing participation by persons with disabilities.

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► feasibility study

INCLUSION IN STANDARDIZATION

Safety versus inclusion: this sums up one of the conflicts arising from different requirements being placed upon products. A feasibility study conducted by KAN provides pointers towards a solution.

ACTION PLAN

As a signatory to the UN CRPD, Germany has undertaken to create equality of access for all people to the physical environment, transportation, information, communications, education and training, and work. The convention has had binding force in Germany since 2009, and is addressed to all state institutions and bodies incorporated under public law. For this purpose, the DGUV has drawn up an action plan that promotes a diverse and inclusive world of work and education. Through this action plan, the DGUV endeavours to achieve “safe and healthy working conditions, including for persons with disabilities. [...] In order to attain its targets, the DGUV will review and if necessary revise standards and regulations within its own scope with regard to how they address the specific needs of persons with disabilities; beyond that, lobby for the revision of acts, ordinances and standards; through its presence on state committees, lobby for consideration to be given to the particular needs of persons with disabilities; increasingly integrate the perspectives of persons with disabilities in current and future activities, including those in the area of prevention, and in new research projects”.

FEASIBILITY STUDY

One of the outcomes of the action plan is directed at KAN: a feasibility study intended to show how OSH-related standardization can contribute to implementation of the UN CRPD. The study is based upon consideration of what abilities a user must possess in order to be able to use a product safely and ergonomically. In this process, it must be considered that standards – and therefore products – are not able to take account of all forms of disability. Instead, the underlying conditions in each case must be considered, and the use of special aids must be possible and permissible.



In this context, the recommendation was made that a section concerning human characteristics and abilities be added to product standards in the medium term.



Standards governing presses, industrial trucks and convection steamers were analysed by way of example in the study. Hardly any of the documents studied were found to make reference to standards, guides, DIN Technical Reports or DIN Handbooks addressing accessibility or particular groups of persons.

ASSESSMENT MODEL

In this context, the recommendation was made that a section concerning human characteristics and abilities be added to product standards in the medium term. This section would analyse the protective measures described with reference to the required human characteristics and abilities. To achieve this, a model was developed by which a product can be evaluated and ranked against a range of human abilities and characteristics: sensory, physical, cognitive, allergies and miscellaneous.

LIST OF RECOMMENDATIONS

The assessment model has been incorporated into a model list of recommendations that is intended to raise awareness on standards committees and among manufacturers for aspects of inclusion. Consideration for aspects of inclusion enables persons with constrained abilities to use products and work equipment without endangering their safety or health.

The model supports the manufacturer of a specific machine or product in providing information on the human abilities required for it to be used without compromising the user's safety or health. It is advantageous in this context for manufacturers to be represented in greater numbers on the standards committees, particularly those of standards concerning product safety.

KAN is now extending the approach adopted by the feasibility study: the list of recommendations is being tested in conjunction with a number of manufacturers. It is then to be presented on standards committees if appropriate. Further publications are planned. ●

DISCUSSION OF BIOLOGICALLY EFFECTIVE LIGHTING

Light is of great importance for human life. It influences vision, the feeling of well-being, and the human biological clock. It consequently also has an influence upon the safety and health of workers. In the absence of adequate daylight, artificial biologically effective lighting can support the biological clock. At the same time, its misuse can knock a healthy biological rhythm out of step.

The German Technical rule for workplaces ASR A3.4 governing lighting requires preference to be given to daylight over the exclu-

sive use of artificial lighting. At many workplaces however, daylight is insufficient. In consideration of its biological effect, the artificial lighting in use

at working premises is often less than ideal. New technologies use the biological effect of the light deliberately: artificial biologically effective lighting is able to support the human biological clock. At the same time, use of the wrong light at the wrong time can knock a healthy biological rhythm out of step, causing fatigue during the day, and sleep disorders. These in turn also increase the risk of accidents.

These biologically effective lighting systems are already in use. The safety and health of the workers must be given priority during selection and control of such systems. During night shifts

for example, lighting must be avoided that, although increasing performance and avoiding fatigue in the short term, also impacts negatively upon the workers' sleep/wake cycle. Such an impact may have an adverse long-term effect upon health.

STANDARDIZATION WORK ITEM

The numerous stakeholders and their different interests present a challenge for occupational safety and health. These stakeholders include manufacturers, planners and researchers, the social partners, and parties involved in occupational safety and health protection. National, European and international standardization activity is also addressing the topic. DIN SPEC 67600, Biologically effective illumination – Design guidelines (Technical Report), for example provides recommendations on intentional use of the biological effect of light for workplaces, including for office areas, retirement and nursing homes, and shift workplaces. In the view of the occupational safety and health lobby, such specific recommendations are as

yet premature, since the opportunities and risks presented by this technology are still largely unclear. In addition, it is the prerogative of the state and the accident insurance institutions to regulate lighting at work premises.

International standardization activity in the area of artificial, biologically effective lighting has begun determining the status quo. ISO will then determine whether current scientific progress is sufficient to permit recommendations for planning.

Although numerous studies of the subject have already been conducted, the results are to some degree contradictory. In Germany however, recommendations for the purposes of occupational safety and health must be based upon validated ergonomic findings. At the same time, specific information is required at the planning stage on how lighting at workplaces must be designed such as to be conducive to good health.

KAN WORKSHOP

In September 2016, KAN organized the “Human Centric Lighting” workshop at Trilux in

Arnsberg. The workshop was attended by representatives of all stakeholders. The objective was to find a common strategy for further activity. Representatives of the research community, the commercial sector, standards developers and the OSH community exchanged their respective viewpoints, and also witnessed examples of application. In particular, the participants discussed the following questions:

- Who bears responsibility for any health hazards caused by unsuitable lighting, given that concrete recommendations for its use are still non-existent?
- Who produces reference documentation for use as guidance for example by planners and employers?
- How can validated findings be obtained on the opportunities and risks presented by artificial, biologically effective lighting?
- How can long-term field studies be launched?

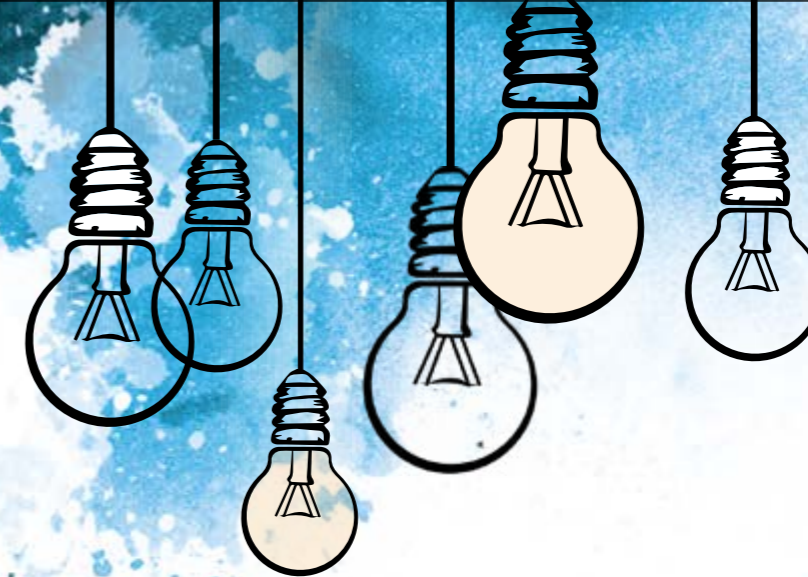
THE “ARNSBERG ROADMAP”

Those attending the workshop considered the features of

“ideal lighting” and the milestones and hurdles that must be passed before it is achieved. Preliminary ideas for solutions were collected in the form of a strategy roadmap: the “Arnsberg Roadmap”. This document sets milestones for open communication between all stakeholders, publication of information, determining of the status quo, and further research, particularly within the scope of occupational safety and health.

FUTURE PROSPECTS

A literature survey commissioned by KAN in close consultation with the DGVU's Lighting subcommittee holds the prospect of delivering more information. It is to produce the most comprehensive compilation possible of scientific findings with a bearing upon OSH, and is to deliver pointers for prevention measures and research issues that have yet to be resolved. The survey is also to encompass the current state of standardization activity at national, European and international level. KAN intends to continue the dialogue with a further workshop at the beginning of 2018. ●



From a biological perspective, artificial lighting is often less than ideal

THE BIOLOGICAL EFFECT OF LIGHT

Natural light changes over the course of a day. Depending upon its composition, it stimulates certain cells in the eye which govern the release of melatonin, often called the “sleep hormone”. This hormone influences the human circadian rhythm. Daylight as natural biologically effective lighting therefore keeps the human biological clock in time. At dusk and in the hours of darkness, greater quantities of melatonin are released.

NANOMATERIALS AT WORKPLACES

What risks do nanomaterials present to human beings and the environment? To answer this question, intensive research is being conducted – including in the area of occupational safety and health. A part of the DGUV's mission is to submit knowledge to international standardization activity.

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OSH experts consider contact with any respirable particles of nanomaterials to be an issue. Fire

and explosion risks may also be relevant to risk assessments. The principle for all scenarios is that should the risks associated with a material be unknown, it should neither be released, nor should human beings come into direct contact with it. This is a proven strategy in occupational safety and health, and also applies to the handling of nanomaterials.

KNOWLEDGE TRANSFER

Rules, regulations, informative documents and other resources are available for tasks involving manufactured nanomaterials at workplaces. In Germany, such tasks lie within the scope of the general requirements of the German Hazardous Substances Ordinance (GefStoffV). Announcement BekGS 527, Manufactured nanomaterials, of the Committee for Hazardous Substances (AGS) provides more specific recommendations. The DGUV's "Safe work with nanomaterials" portal compiles these resources and other information. The knowledge is also available in the form of digital training material (in English and German) in the modern "Nanorama" e-learning applications.

Nanotechnology has now transitioned from research to commercial applications, as can be seen from numerous new standardization documents at European and international level. Problems arise when commercial nanotechnology impacts upon occupational safety and health: Article 153 of the Treaty on the Functioning of the European Union (TFEU) makes no provision for occupational safety and

health directives to be supported by standards in Europe. The German Consensus Statement policy paper published in 1993 and the policy paper on the role of standardization in the safety and health of workers at work, based upon the former and published in 2014, state that standards may govern aspects of the safety and health of workers at work only in exceptional, clearly defined cases.

STUDY

Where the standardization of nanotechnology is concerned, the situation is very unclear. This makes it difficult for the occupational safety and health lobby to exert a selective influence. KAN therefore conducted a study in 2015/2016 with the objective of examining the standardization situation systematically. A status review was performed of 260 documents with direct relevance to nanomaterials. The results showed that standardization activity takes place primarily in committees specific to nanotechnology, and to a lesser degree in committees concerned with extending the existing measurement and other methods into the nanosphere.



RELEVANCE

The majority of documents describe test and measurement methods. Further standards concern definitions of terminology, material specifications, and process descriptions and guides. Around 30 documents can be considered directly relevant. They concern aspects of occupational safety and health that are already regulated in Germany by the state or the accident insurance institutions. They contain for example information on the determining and evaluation of exposure, or measures for risk management. The majority of documents at European or international level containing provisions impacting upon the safety and health of workers at work are technical reports or technical specifications.

STRATEGY GROUP

Many of the documents describe projects currently in progress, the precise content of which is still unclear. Since this content could overlap existing provisions, however, OSH experts must observe the progress of these projects closely. In order for German expertise to be submitted in a coordinated form to the standardization process, the experts scattered across numerous committees must be networked closely.

This is the background to the recommendation to the KAN Secretariat to create a national strategy group. The tasks of this group should include:

- Observing work items which OSH experts believe may conflict with German rules and regulations
- Coordinating positions on OSH, and developing strategies by which they can be carried through
- Coordinating involvement of (further) experts in standardization
- Stepping up public-relations work

Further recommendations for action are addressed to the Federal Ministry of Labour and Social Affairs (BMAS)/ the European Commission, and to DIN/CEN and ISO. ●

Web link Nanopartikel: information on nanomaterials and safety research in comprehensible form: www.nanopartikel.info

Announcement on Hazardous Substances (BekGS 527) of the AGS Committee for Hazardous Substances with recommendations for safety and health during occupational tasks involving nanomaterials: www.baua.de
► Hergestellte Nanomaterialien

KAN study "Standardization of nanotechnology – a status review and requirements analysis from the occupational safety and health perspective", VFA e. V., 2017: www.kan.de
► Publications ► KAN Studies

German Consensus Statement on the role of standardization in the context of directives under Article 118a of the EC Treaty: www.kan.de
► German Consensus Statement

Policy paper on the role of standardization in the safety and health of workers at work: www.bmas.de ► Policy paper on the role of standardization

SATCHELS: COOL DESIGN AND STILL SAFE?

Ensuring that children can be seen by road users on their journeys to and from school helps to prevent accidents. Safety is enhanced by satchels with adequately large reflective and fluorescent areas. These high-visibility areas are however evidently “uncool”.

DIN 58124, “Satchels – Requirements and testing”, specifies that at least 10% of the rear and side surfaces of a satchel must be fitted with retro-reflective material. This increases visibility in the dark when a vehicle’s headlight beam falls upon the satchel. Reflectors are of no benefit to visibility in daylight, however. During the hours of daylight and at dusk, fluorescent materials in orange/red or yellow enhance visibility. The standard specifies that the fluorescent material must be used for a fifth of the surface area.

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SUB-STANDARD

Whereas reflectors are widely fitted to satchels, satchel manufacturers are increasingly failing

to equip their products with fluorescent areas. The designers evidently have difficulty reconciling pink princesses or dark dragons with the colours specified in the standard. At purchase, families attach more importance to the desire to be “cool” than to the safety aspects. Advertising for the satchels may also convey the impression that safety is still adequate. As a result, more and more children are travelling to and from school with a sub-standard level of visibility during the hours of daylight.

REVISION

Since 2016, the standard has been undergoing revision to bring it into line with the state of the art. Manufacturers, suppliers, consumer protection experts, the German Technical Inspection Association (TÜV), and – with responsibility for preventing accidents among schoolchildren and students – the Schools sub-committee of the DGUV, the IFA, and the KAN Secretariat are represented on the standards committee. Revision of the standard presents an opportunity to reconcile the requirements for style and visibility. One approach is for further

fluorescent colours to be permitted in addition to the orange/red and yellow associated with high-visibility jackets, and for manufacturers to be allowed greater freedom in design.

GUIDELINE MEASUREMENTS

The German Social Accident Insurance Institution for the public sector in North Rhine-Westphalia (UK NRW) has instructed the IFA to support the revision scientifically by conducting visibility measurements. For this purpose, the colour coordinates and luminance factors of satchel colours such as fluorescent green/yellow and pink were measured in the laboratory by means of standardized methods. IFA experts have also conducted preliminary tests of satchels with and without fluorescent colours at dusk. The results are feeding directly into revision of the standard, and can be discussed with the parties involved.

RAISING OF AWARENESS

It is also important for the wider public to be made aware of the topic. Parents and children, teachers in schools and preschool childcare facilities, sales staff, and other individuals involved in the selection of a satchel should be aware of the safety aspects. The Educational facilities expert committee of the DGUV, the IFA and KAN, together with their partners, are committed to achieving this. ●

► The IFA is studying the visibility of satchels at dusk, with and without fluorescent colours.

KANelot: LEARNING ABOUT STANDARDIZATION THROUGH PLAY

Castle KANelot in the Middle Ages. The knights are not happy. Helmets are starting to rust, visors are forever sticking. The solution: a standard, of course! How such a standard is produced is explained in the form of a game – the KANelot board game.

Standards make an important contribution to preventive activity. For OSH experts who themselves work on standards committees, an understanding of the procedures is of fundamental importance. Only with such an understanding can they introduce aspects of workplace safety and health effectively into the standardization process.

For this multifaceted process, it’s essential to be well equipped. KAN has therefore selected an unusual way of communicating the necessary knowledge. With the “KANelot” board game, illustrated by cartoonist Michael Hüter, you can become familiar with the standardization process and have fun at the same time. A booklet provides valuable

information on each step along the way. The OSH knights and ladies of KANelot and the OSH knights of the Standards Table embark on their journey from the idea to the harmonized European standard. On this journey, they must brave dragons and cope with all manner of other snares.

Not only does the game explain the formal procedures of standardization, it also provides the players with useful insights into associated aspects. What must be considered for example when an application for standardization is made? How important is informal discussion during coffee breaks? Who can provide help with translations of technical terms such as “Verschluss-schnallenjustierschraube”? ●

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Web link More information on KANelot, where to order, and the online version of the game can be found at: www.kan.de/en/publications/kanelot-the-game



MAKING THE FIRE SERVICE SAFER

Protective clothing is literally a life-and-death issue for firefighters. Standardization has an important role to play in the evaluation of personal protective equipment. In future, this role will extend to the “smart” features of such equipment.

During routine work performed by the fire services, in particular when actually fighting fires, firefighters are frequently exposed to hazardous situations. It is important for them to be able to protect themselves against hazardous exposure, by technical and organizational measures and by personal protective equipment (PPE). Personal hygiene is also an issue: for example, hazardous substances must be prevented from being carried back into fire stations on contaminated clothing. However, even where PPE geared to the particular circumstances is used, it does not always protect fire service personnel against contact with hazardous substances. Fumes for example may be deposited on the skin during deployments.

► Firefighters during a deployment. Firefighters made clear at the KAN workshop what their expectations are of smart PPE: additional functions must always enhance safety. Gimmicks and the excessive collection of data must be avoided.

RESEARCH PROJECT

The health risk presented by the uptake of hazardous substances by the dermal route has not yet been adequately clarified. Together with two of its institutes (the IPA and IFA), several of its accident insurance institutions, professional fire services and professional associations, the DGVV is therefore launching a research project in 2017. The project will examine exposure to carcinogenic substances during deployments of fire service personnel in real-case fire situations, and will clarify

whether and in what way carcinogenic substances can be taken up through the skin. The results will be incorporated into the standardization process of PPE.

SMART PPE

The findings will also support the development of smart PPE. This is PPE that is enhanced by the use of intelligent components in order to increase the level of protection provided. Examples of this are sensors that measure and display the level of hazardous substance exposure. PPE is also conceivable that is able to detect whether it has been put on properly and is properly sealed.

Examples of smart PPE are already appearing at trade fairs and are available for purchase. Smart protective clothing of this kind, specifically for firefighters, has been the subject of research for some years now. Sensors measure data on ambient conditions such as temperatures and the composition of the air, and also on the position and physical condition of the wearer, such as heart rate and body temperature. The data are recorded and can be transferred, for example in order to determine whether the person is fit for deployment.

WORKSHOP

Based upon a mandate from the European Commission, standards

will contain technical descriptions of smart PPE for protection against heat and flames, and formulate methods for testing their protective action. The process, which is still in its early stages, is ideal for the submission of occupational safety and health aspects. For this purpose, KAN has polled the opinions of users in a workshop attended by full-time, company and volunteer firefighters. The German Social Accident Insurance Institutions for the public sector – which insure service personnel – were also represented at the workshop, as was the IFA and the BAuA.

The workshop summarized experience, suggestions, needs and concerns. Based upon these, concrete proposals were made for the standards:

DATA

- “Less is more” is the maxim when it comes to presentation of the data. Emergency service personnel otherwise risk being overloaded with information that either distracts them from their principal tasks, or is simply ignored.
- Wearers wish to decide for themselves when particular data are displayed.
- It should not be permissible for the systems to collect and store wearers’ biometric data continuously or by default.



FUNCTIONALITY

- Systems should permit flexible adaptation to the given deployment scenario. For this purpose, it should be possible for the PPE to be fitted with sensors ideally on a case-by-case basis.
- Owing to their experience with speech communications in burning buildings, the workshop participants question whether a reliable wireless link between sensors on protective equipment and a central control point is feasible.
- The experts consider data on the condition of the protective equipment following an assignment to be very useful: what form of cleaning is required? And is the level of protection still assured?

ACCEPTANCE

- All supplementary functions must function reliably at a high level. Facility must be provided for the functions to be tested prior to a deployment.
- The equipment must be practical and ergonomic in its operation.
- Its care and maintenance must not entail substantial additional effort.
- Users must be fully informed regarding the mode of operation, functions and limits of the smart elements.

The workshop also yielded approaches for occupational safety and health. The workshop participants questioned the practical benefits of the products

already available on the market. In their view, an improvement in safety is not always evident. Comprehensive information on supplementary functions and their impact upon the safety level is important. The workshop participants regard thorough instruction of all parties concerned as absolutely essential; this also applies to additional maintenance and/or care tasks, such as checking of the sensors following washing. Workers and superiors alike also require clear information to determine who is permitted to receive and use what data, and when.

CONCLUSION

KAN will submit the results to standards committees in the form of an opinion agreed with users from the field. On the one hand, standards developers are called

upon to consider this knowledge from the field carefully when formulating OSH requirements. On the other, firefighters should take into consideration the results, both when purchasing smart PPE, and when formulating rules for its use. ●

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Web link Smart protective clothing: firefighters’ opinions: www.kan.de
► Publications ► KANBrief ► 4/16

KAN PRAXIS MACHINE ERGONOMICS

KAN's activities result in greater attention being paid to the ergonomics of machinery: at purchase, during design, and in product standardization. These activities include the KAN Praxis web portals.

KAN's aim is for ergonomics standards to be highly suited to application in the field. It draws attention to solutions that are easy to apply and to good ideas for manufacture and purchase. Attainment of these aims is supported by KAN's web portals, which for

example make it easy to identify a suitable standard: the NoRA OSH standards search tool, and its counterpart ErgoNoRA, specifically for standards with ergonomic content.

MACHINE ERGONOMICS

It is unquestionably a binding statutory requirement that machines should be designed

to be ergonomic. Many of the parties involved are looking for good solutions. In the reality of machine construction however, ergonomics is still frequently regarded as a luxury, or – cynics might say – optional altruism.

This is another area in which KAN is now helping to disseminate experience from the field by means of a web portal. On its "KAN-Praxis machinery" portal, KAN has compiled design examples of ma-

chines and machine components that satisfy ergonomic criteria particularly well. The examples also show how hazards resulting from inadequate ergonomics can be avoided. Finally, some of these solutions can be fed back into standardization activity.

Searches for specific examples are possible in a number of different ways:

- By machine or detail solution
- By ergonomic problem
- By means of the search function

With this resource, KAN aims to make the subject accessible not only to manufacturers, but also to purchasers and other interested parties, and to provide answers to the following questions:

- What characterizes an ergonomically designed machine?
- What aspects must be considered during design?
- Where can relevant information be found?
- What standards are relevant?

The examples are presented in some cases by photographs, in others by eye-catching drawings. Further examples, from all areas of machinery, are welcome: submit your own using the online form. ●



We appreciate
your feedback!

Access the site at:
<https://maschinenergonomie.kan-praxis.de/>

COMPARISON OF MEASUREMENT RESULTS FOR BIOLOGICAL AGENTS

When does exposure to biological agents necessitate special protective measures?

This is a question facing companies whose employees' work brings them into contact with microorganisms whether intentionally or incidentally.

All human beings come into contact with biological agents, in the environment and in daily life. Individuals who are exposed by virtue of their work tasks to microorganisms, their cell wall components or metabolic products may contract infections or allergies, or may experience reactions to the toxic effects of these substances.

This occurs when one or more criteria are met:

- The concentrations lie well above the natural background concentrations.
- Suitable transmission and uptake routes exist.
- The body's own defence mechanisms are impaired.

EXPOSURE

In contrast to hazardous substances, health-based limits do not exist in Germany for biological agents, nor is measurement of their concentrations at workplaces mandatory. Good reasons nevertheless exist for being able to assess workers' exposure to them. Examples are formal recognition of cases of occupational disease, and examination of the efficacy of measures for protection and redevelopment.

IFA FOLDER

If results from different tasks and work areas are to be compared, they must be obtained by means of a uniform measurement strategy and standardized methods. The IFA has therefore produced the IFA Folder for the measurement of hazardous substances. The folder contains methods for the measurement of moulds, bacteria and endotoxins in the atmosphere. These methods have the status of national specifications in Germany for the measurement of biological agents at the workplace.

STANDARDIZATION

In addition, the DGUV's expertise on workplace measurements of biological substances feeds into European standardization activity:

a working group of which the IFA is a part is updating European standards governing the measurement of bioaerosols at workplaces. The Austrian General Accident Insurance Board (AUVA) and the DGUV have also evaluated a test chamber for bioaerosols in a research project. This research activity, conducted under standardized conditions, provides answers to questions that as yet are still open regarding different sampling and analytical detection methods for bioaerosols. ●

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Web link IFA Folder on the measurement of hazardous substances
www.dguv.de, Webcode: e21801

NEW RULES OF THE GAME

Topics with a bearing upon safety and health should serve as the yardstick for standardization. Rules and regulations take priority over standards. A policy paper explains the rules of the game.

Standards are increasingly being developed at European and international level. This gives rise to a conflict both with the fundamental concept of consensus and broad participation by the stakeholders, and with the envisaged time frame for development of the standards. Examples of such structural and procedural challenges are the new "DIN SPEC prestandards" and "Technical Reports". Many topics with a bearing upon safety and health are also new, particularly under the heading "Industry 4.0" (smart manufacturing). Technological developments grouped under this heading are accompanied by greater networking and new forms of work.

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Web link Catalogue of prevention services of the German Social Accident Insurance Institutions: www.dguv.de; Webcode: d1090649; German Consensus Statement on the role of standardization in the context of directives under Article 118a of the EC Treaty: www.kan.de
► German Consensus Statement; Policy paper on the role of standardization in the safety and health of workers at work: www.bmas.de
► Grundsatzpapier zur Rolle der Normung

Further topical issues are:

- Standardization, sponsored by the European Commission, of services in the health, social and other sectors
- Governing of fitness examinations and requirements in standards
- Requirements for qualifications in standards
- Standards governing artificial, biologically effective lighting

PREVENTION

Standards play a major role in satisfaction of the German Social Accident Insurance Institutions'

prevention mandate. They are used by these institutions as an instrument for the prevention of occupational accidents, occupational diseases, and work-related health hazards. Standards developed jointly by the stakeholders constitute part of the clear, comprehensible and cohesive body of German OSH rules and regulations. They are an integral element in the body of regulations within the catalogue of prevention services delivered by the accident insurance institutions.

POLICY PAPER

In the German Consensus Statement, formulated in 1993, Germany rejected standardization activity within the scope of directives under Article 153 of the Treaty on the Functioning of the European Union (TFEU). Areas were defined in which standardization is possible and may be advantageous. As a result of European and – in particular – international developments, however, this position has proved to be no longer tenable. In the light of this, the policy paper on the role of standardization in the safety and health of workers at work was published in 2015. This paper was produced in a working group established by the BMAS, comprising representatives of the highest legislative authorities of the German regional OSH administrations, the DGUV, the SVLFG, the social partners, DIN, the VDE, the BAuA, and the KAN Secretariat.

"The paper constitutes a new milestone in the relationship between occupational safety and health and standardization," acknowledges Dr Rainhardt Freiherr von Leoprechting, Chair of the Governing Committee of the Association for the Promotion of Occupational Safety in Europe (VFA). It emphasizes the priority accorded to rules and regulations of the state and the German Social Accident Insurance. The paper sets out that as a general rule, no standardization activity may be launched within the scope of directives under Article 153 of the TFEU. At the same time however, it cancels the rigid distinction made by the German Consensus Statement, and permits review on a case-by-case basis.

RULES OF THE GAME

Standardization in the sphere of the occupational safety and health of workers at work is no longer ruled out per se – provided certain criteria are met. The policy paper describes the "rules of the game" under which work items in the sphere of the safety and health of workers at work may be launched and supported. It also describes possible ways in which

standards may be used within the body of rules and regulations of the state and the accident insurance institutions. KAN approves the policy paper in its amended, updated and valid edition with regard to standardization within the sphere of the safety and health of workers at work.

DESCRIPTION OF THE PROCESS

KAN has developed and described a process suitable for use in practice for examining the suitability of new work items with reference to the policy paper. KAN also continually channels and articulates the position of the occupational safety and health lobby concerning standardization within the sphere of the safety and health of workers at work. The process is coordinated by the KAN Secretariat, which functions as an interface between DIN and the committees of the state authorities and accident insurance institutions. The aim is for a decision enjoying the support of all stakeholders in OSH to be reached on the work item in question.

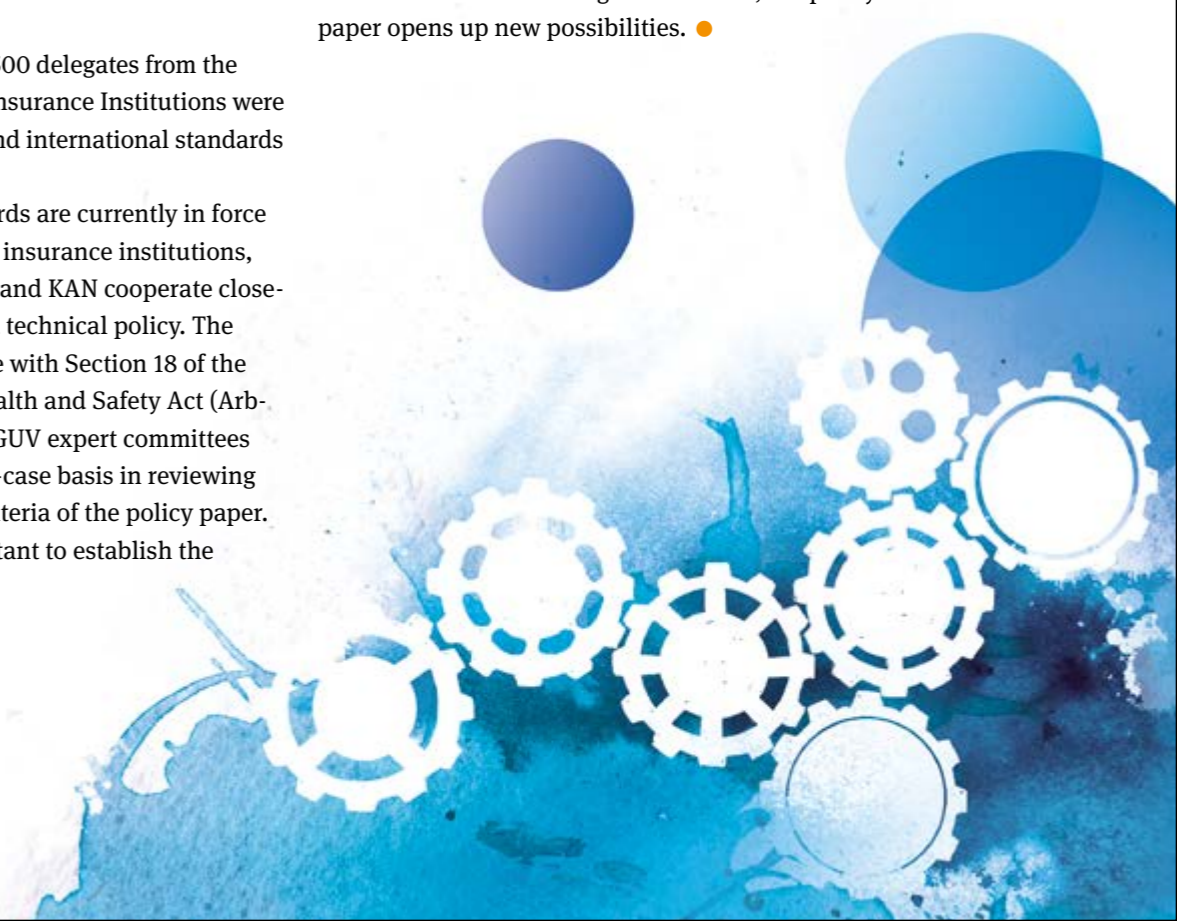
FUTURE PROSPECTS

As at January 2017, some 500 delegates from the German Social Accident Insurance Institutions were active on 1,365 national and international standards committees.

Around 34,000 standards are currently in force in Germany. The accident insurance institutions, DGUV expert committees and KAN cooperate closely in areas of strategy and technical policy. The committees in accordance with Section 18 of the German Occupational Health and Safety Act (Arb-SchG) and the relevant DGUV expert committees are involved on a case-by-case basis in reviewing work items against the criteria of the policy paper. In future, it will be important to establish the

mechanisms of the policy paper in practice. This is supported decisively by the KAN working group's description of the process, in which work items can be assessed flexibly and by approximate estimation in the interests of safety and health on a case-by-case basis. Documentation and analysis by the KAN Secretariat will yield findings regarding the suitability of the policy paper for use in practice. Parallel to this process, the DGUV is planning the creation of an "early-warning system" for the statutory accident insurance system to enable it to take action when work items relevant to occupational safety and health are launched.

In this context, standardization and the role of the expert committees should be regarded as opportunities with regard to the body of OSH rules and regulations. For this purpose, the interrelationship between the rules and regulations of the state and the accident insurance institutions on the one hand and standards on the other may have to be shaped with a stronger topic focus in the future. As one module of a strategic framework, the policy paper opens up new possibilities. ●



OCCUPATIONAL HEALTH



A problem in one country will quickly become a problem elsewhere. That goes for new forms of production, new products, and new toxic hazards, but also for challenges to society such as fragmentation of work and ageing.



Jukka Takala, President of the International Commission on Occupational Health (ICOH)

MANAGEMENT OF AGEING WORKERS STARTS WHEN THEY ARE IN THEIR EARLY 20S

Interview with Jukka Takala, President of the International Commission on Occupational Health (ICOH) on Occupational Health.

Safety and health at work – what is the role of occupational health today?

Occupational health has always been pivotal to maintaining and promoting safety and health at work. However, it is much easier to track the physical work environment and to identify gaps in safety than to assess the longer term health impact of various risks. For health based risk assessment and management we need qualified staff, including suitably trained doctors, nurses, occupational hygienists, ergonomists, physiotherapists and people with knowledge of psychosocial aspects who are familiar with individual workplaces. Such expertise is usually not available in companies, so we should make sure that each company has an understanding of its own priorities, and of how it can obtain further advice. Risk management at work includes identification and evaluation of both visible and often hidden

health risks, stresses, strains and complaints faced by the workers. A bigger company or organisation may have its own expertise, but all work settings including SMEs should have access to such support. All workers should be covered by at least basic occupational health services, in addition to legal protection, monitoring by labour inspection and adequate workers' compensation systems, all of which must support risk prevention measures at work. At present, such provisions cover only a tiny fraction of the workforce of the world.

You have been working for various international occupational safety and health organisations for more than 40 years now.

Can international cooperation solve national problems, too? Production of material goods and services has become increasingly globally interlinked, many health and safety challenges are crossing borders and can be observed

simultaneously in a large number of countries worldwide. Today we share the same production and working methods, machinery and tools globally. A new invention – a new phone, new drug or production method – will in no time be made available everywhere. We also share the same metabolism and DNA. The impact of risks at work is the same in China and the USA. The difference is that due to wide disparities in resources and poverty, manpower costs vary widely. And this means automation and robots in one location and workers with much greater exposure in another.

Industrialised countries have claimed successes in health and safety. But at what expense?

Much of the risky work has been relocated to countries where the cost of work is very low. Interdisciplinary, international solutions, involving sharing experience between different countries, are called for. Transfer of technologies must go hand

in hand with the knowledge of involved risks. A classic example is – still – asbestos. Intense international cooperation on asbestos in many developed countries has brought us very close to a solution. But I am observing how problems – regarding, for example, how products containing asbestos are handled – have shifted to the developing world, where they will continue to be with us for decades. Primary prevention work is needed, in particular, in banning new use of asbestos. This is another example of the Vision Zero movement and mind-set. But the consequences of asbestos exposure need to be

really have to wait 30–50 years before taking action?

Joint efforts are needed to establish international standards and international programmes to work out solutions together. International organisations have an important role to play in facilitating dialogue to produce locally acceptable solutions to such risks. Methods that have been tried and tested in the industrialised countries may need adaptation for use in developing and emerging markets. However, the worker is not a commodity.

International problem-solving in the area of prevention is also the best way to tackle the new

now also replicated in Singapore, and hopefully gradually more widely in Asia.

What special challenges would you say new forms of work are creating for occupational health?

For many years now, the emergence of new forms of work and in new locations has presented health personnel at work with additional challenges. These developments have also led to an intensification of work, growing workload and time pressure without opportunities for monitoring, the blurring of the boundaries between work and



The gathering of evidence takes a lot of time and in the meantime we should follow the precautionary principle in taking preventive action.



dealt with responsibly, too, for example through measures to identify asbestos-related diseases as early as possible. Many, in fact most, countries using asbestos liberally today claim that they have not found any problems. Their asbestos is “safe”, their workers are resistant, their lungs tolerate dust and fibres. Do we

global challenges facing health and safety at work – for example the digitalisation of the world of work. Digitalisation crosses national boundaries with ease, so prevention needs to do the same. A particularly shining example of an initiative aimed at identifying new risks early on is EU-OSHA's European Risk Observatory (ERO),

home life, an ageing workforce, and growing psychosocial demands on workers. The figures for workers unable to work or taking early retirement due to illness or accident clearly show how urgently suitable advice and support are needed for those affected. For example, in Finland three quarters of work



disability pensions are caused by two problems: psychosocial factors causing mental health disorders, and musculoskeletal disorders. The size of the burden exceeds that of unemployment. I consider that such long latency risks – often hidden – need to be better managed by companies and work organisations using

to those planning and organising work. The link between occupational health services and management systems is vital.

Is “Risk Management 2.0” or “Work 4.0” bringing with it an entirely new set of challenges for the world of prevention?
Most of the risks we know about

working hours create serious negative outcomes. Downsizing of workforces due to economic constraints is a risk for those becoming unemployed but also for those who remain at work. They will have an additional workload, they feel bad due to the treatment of their dismissed colleagues, and the workplace climate is

development of new production processes and materials such as nanomaterials that are being rushed onto the market before their possible effects have been properly investigated. To assess possible health risks right from the development stage of a new technology – as in technology impact assessment – we need

ing from exposure today – how much of a problem is that, now that many carcinogenic substances are either banned or at least heavily regulated?
Sadly, despite all the prevention work done in the last few years, this is still a major issue. The figures just published by the European Union are quite

er European study – without the social and loss of wellbeing costs in the Dutch report – amount to 0.77% of GDP of the EU28, or 118 billion euros each year. This was based on the calculation of the disability adjusted life years, DALYs, in the European Union. One will have to bear in mind that additional carcinogens, car-



support provided by occupational health service providers and qualified staff. WHO stated that out of the total resources spent on health, 93% are being spent on treatment and only 7% on prevention. New policies are needed. Occupational health specialists together with production managers, supervisors, and the workers themselves have a central role to play here, too. Those who treat people and identify negative outcomes caused by work should be linked

today will not go away, even though the exposures and the people affected may change. Thinking about hazardous substances, we will have large populations subject to relatively low exposure levels. Or we will see combined effects of several risks that create synergies and difficulties in identifying the causes, such as external tobacco smoke (ETS) or passive smoking combined with dust (e.g. silica) or radon. Similarly, stress and night work or stress and long

down. As a result the number of cardiovascular diseases and deaths goes up. We cannot give up on our preventive efforts in these areas.
We are also left with many legacies from the past, for example occupational cancers which could have very long latency periods. Also, if your stress and night work combination caused a cardiovascular disorder in the past, it will continue to be present for the rest of your shortened life. Then there is the rapid

thorough toxicological investigation methods, human exposure assessments or molecular and epidemiological studies. Other methods for analysing potential health risks include in-depth testing on model substances as well as read-across studies. Suitable tools still need to be developed, or at least developed further, to make these things possible.
You talk about occupational cancer as a legacy of the past. But what about cancer result-

unambiguous, attributing 53% of work-related deaths to cancer. Every year, roughly 120,000 workers across the EU – that’s 120,000 people like you or me – contract work-related cancer and about 100,000 lose their lives. The consequential costs of exposure to carcinogenic substances at work have been estimated by the Dutch RIVM Institute to be in the order of 334 (242-440) billion euros (one billion in this case is 109 or one thousand million). The initial cost estimates from another

European study – without the social and loss of wellbeing costs in the Dutch report – amount to 0.77% of GDP of the EU28, or 118 billion euros each year. This was based on the calculation of the disability adjusted life years, DALYs, in the European Union. One will have to bear in mind that additional carcinogens, carcinogenic agents, processes and jobs are constantly being identified, assessed and gradually added to the lists of IARC/WHO. The gathering of evidence takes a lot of time and in the meantime we should follow the precautionary principle in taking preventing action.
What specific measures are you thinking of?
On the one hand primary prevention, of course – in other words preventing exposure in the first

▲ every year, roughly 120,000 workers across the EU – that’s 120,000 people like you or me – contract work-related cancer and about 100,000 lose their lives.



place. Where a substance's carcinogenic potential is already known, this means mainly eliminating the carcinogens, changing the process or substitution, but also technological protective measures and bans. Where the carcinogenic potential is either

silica dust, and 86,000 globally. What should the exposure limit be: 0.1 mg/m³, or 0.05 mg/m³ as recently introduced in the United States by the Obama Administration, estimating that lowering the limit value from 0.1 to 0.05 will eliminate two thirds of related

deterioration, and diagnosing and treating cancers and other long latency problems at an early stage are equally important. Treatment therapies are generally more likely to be successful in cases where the disorder, such as a tumour, is discovered early on. Like radiology, biomarkers for early detection will also assume a central role over the next few years.

What topics do you expect will be the focus of occupational health research in the future? And what topics should we focus on over the next few years?

The range of topics being researched is already wide, and is growing all the time. First of all, we should have a reliable picture of the magnitude of risks, disorders and deaths in order to identify prevention priorities. Traditionally, we are well aware – in industrialised countries – of the number of fatal injuries, less well aware of the non-fatal and minor ones. But we have poor knowledge if any of the real magnitude of long latency health problems and the key factors causing them. One cannot eliminate diseases or disorders as such. But we can eliminate and radically reduce the factors behind them – the exposures causing the problem – one by one. Our indicators are equally poor. Death is easy to understand, but although many serious risks cause a small number of deaths or no deaths

unknown or uncertain, we need science to supply robust data as quickly as possible. Sometimes, even though the scientific data have long been crystal-clear, implementation at a sociopolitical or legal level is slowed down by the need to reconcile many different points of view. Respirable crystalline silica or stone dust is a typical example. In the EU28 around 7,500 deaths every year are caused by carcinogenic

deaths? We probably need more courage to simplify political decision-making structures, hierarchies and processes. However, other measures, such as wet processes, training and personal protection are important when the higher hierarchies of control are not available. Furthermore, detection of work-related exposures and early measures of identifying problems, regular screening tests e.g. lung function



at all, they have enormous other negative outcomes, such as long term absences from work, presenteeism, poor workability and employability, premature disability and forced retirement, and huge related losses to society and to the affected workers themselves. Musculoskeletal disorders are typical examples. I believe that we should measure not only the deaths and injury/disease numbers, but also the DALYs, the Disability Adjusted Life Years. This is a common WHO indicator and is applicable to occupational diseases, disorders and injuries in exactly the same way as to non-occupational causes. Another point is that we should change the paradigm of sorting out problems occurring on a typical workday from 8am to 5pm. Rather, we should start preventing problems before the newcomers enter the workforce, in universities, vocational schools, and even in day care centres. Management of ageing workers starts when you are in your early 20s. And the target is that all workers can have a healthy working career and retire while still healthy, a healthy work life!



A further area of action is the early investigation of the possible hazards arising from new technologies and materials during their development and manufacture. Others include investigations of new ways of working that will enable older employees and those who are restricted in their

output to be integrated fully into the organisation's processes. And of course studies of psychosocial strain and musculoskeletal disorders.

What can national and international OSH organisations contribute to this process?

I would say a great deal! By exchanging experiences they can identify new risks early on and communicate solutions – both to those at risk and to political decision-makers – for example by sharing good practice. A problem in one country will quickly become a problem elsewhere. That goes not only for new forms of production, new products, and new toxic hazards, but also for challenges to society such as fragmentation of work and ageing.

The G7/ILO Vision Zero process will need a lot of support to be successful. ILO and WHO can – with support from ICOH and other expert bodies – harmonise their methods of measuring problems and progress, such as the present “Global Estimates” to include DALYs. I also find the “No Time to Lose Campaign” of IOSH and the online platform “Roadmap on Carcinogens”, which was initiated by the EU, a very positive development for combating this spread – it calls on companies, agencies and other organisations to share their good practice in preventing or reducing carcinogen exposure at work. ●


Like radiology, biomarkers for early detection will also assume a central role over the next few years.


NEW APPROACHES

The Institute for Prevention and Occupational Medicine of the German Social Accident Insurance, Institute of the Ruhr-University Bochum (IPA) is currently developing effective, minimally invasive biomarkers for lung cancer and mesotheliomas for use in preventive follow-up examinations.

Among occupational diseases in Germany, cancer is responsible for over 50% of deaths and continues to be an important cause of death. In this context,

former occupational exposure to asbestos is a particularly important occupational risk factor. Secondary prevention by follow-up preventive care aims to detect early stages of cancer in insured individuals who have been occupationally exposed, since the

earlier cancer is detected, the greater the likelihood that treatment will be effective.

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MOLECULAR MARKERS

Early detection of cancer by follow-up preventive examinations requires suitable and, preferably, minimally invasive or non-invasive methods. Molecular markers that can be determined in blood, saliva, urine, and other body fluids are most suitable for this endeavour. A further benefit is that collection of minimally invasive biosamples is not burdensome for the individual and involves virtually no health risks.

Development of new biomarkers for the early detection of cancer is divided into three phases:

1. IDENTIFICATION OR DISCOVERY PHASE

Search for new marker candidates that are able to distinguish between individuals with and without cancer (cross-sectional design).

2. VERIFICATION PHASE

Marker candidates are verified in a large, independent patient group (cross-sectional design).

3. VALIDATION PHASE

Marker candidates for early cancer detection are validated in a prospective (longitudinal) cohort study involving individuals who are free of cancer at the beginning of the study.

PURE-LUNGE 2: VERIFICATION OF NEW MOLECULAR MARKERS FOR THE EARLY DIAGNOSIS OF LUNG TUMOURS

The DGUV is sponsoring the ongoing study entitled "Verification of new molecular markers for early lung-tumour diagnosis in follow-up preventive care". In this study, the IPA is cooperating with the Bonn/Rhine-Sieg Clinical Cancer Centre and the Institute of Pathology at the University Hospital Cologne. For marker verification in an independent group of lung-cancer patients, the research teams are studying numerous biomarker candidates that were identified in the pilot study, which was also supported by DGUV research funding.

The aim of these projects is to detect tumour markers in easily accessible body fluids such as saliva or plasma.

Such markers could supplement the conventional radiation-intensive or invasive diagnostic methods used for early diagnosis of cancer in suspicious pulmonary lesions, such as those used in the DGUV's low-dose high-resolution CT (LD-HRCT) service, and could potentially improve the specificity of early cancer diagnosis. Biomarkers could thus serve as a valuable component of follow-up preventive care among individuals at increased risk of developing lung cancer.

In cooperation with the bioinformatics department of the Ruhr-University Bochum, the IPA is currently developing multi-marker panels at different molecular levels which may permit even more precise detection rates of tumours compared to the use of single biomarkers.

The cross-sectional analyses of the discovery and verification phase, however, are not able to determine conclusively whether early marker-based diagnosis was successful. In order to be used in occupational medical or clinical practice, markers need

to be validated in a longitudinal study including individuals who have not yet fallen ill with cancer. Plasma samples from workers with a diagnosis of the occupational disease BK 4103 (asbestosis) who are at a particularly high risk of developing lung cancer can be used for this purpose. Such samples are available from the MoMar ('Molecular Markers') study at the IPA.

MoMar: MOLECULAR MARKERS FOR EARLY DETECTION OF CANCER

For insured individuals formerly exposed to asbestos, follow-up preventive examinations are important in order to detect and treat cancer as early as possible. The aim of the study, launched in 2008, is the development and concluding validation of minimally invasive markers for early detection of lung cancer and mesotheliomas.

Since early stages are rarely detected in day-to-day clinical practice, a prospective study is required: healthy subjects at an elevated risk of developing cancer are examined regularly over an extended period, and the biological samples taken (such as blood) are stored in a biobank. Towards the end of the study, the biomarker results from individuals who have developed cancer are compared with the results of those who have not.

Insured individuals with a recognized case of occupational disease No BK 4103 who already take part in follow-up examinations offered by the German Social Accident Insurance are requested to participate in MoMar. Altogether, over 2,700 insured individuals were recruited, the majority of whom attended the annual examinations several times, in some cases as frequently as nine times. At 86%, the participation rate was excellent. To date, over 10,000 MoMar examinations have been performed in 26 practices and clinics throughout Germany. This was possible only with the support of six German Social Accident Insurance Institutions (BGHM, BG RCI, BG ETEM, BG BAU, BGHW and BG Verkehr). Plasma and blood samples, totalling about 50,000, were divided into 180,000 subsamples and stored in the MoMar biobank. By the end of 2016, 26 mesotheliomas and 47 lung tumours had occurred within the MoMar cohort. Sampling will be continued until

BIOBANKS

In a modern and powerful biospecimen bank, biological samples are stored in accordance with quality-assured principles of good scientific practice. Quality-assured biobanks are a fundamental element for study of changes in the human body prior to and during the course of disease development, and are used, for example, to identify and validate biomarkers for early disease detection. Biomarkers thus constitute an essential part of modern occupational medical research. In combination with biomonitoring methods, samples permit more precise and efficient measurement of (occupational) exposures, which is particularly beneficial for primary prevention in occupational medicine, for example for the assessment and monitoring of health hazards presented by hazardous substances. These risks can thus be detected and classified more quickly.

Biospecimen collections with a primary occupational medical focus are rarely found outside the IPA.

FOLLOW-UP PREVENTIVE MEDICAL CARE

Follow-up preventive medical care is occupational medical prophylaxis following termination of certain tasks that may lead to health disorders after longer latency periods. Reasons for follow-up preventive medical care include tasks involving exposure to Category 1A or 1B carcinogenic or mutagenic substances or mixtures in the sense of the German Hazardous Substances Ordinance (broadly equivalent to carcinogenicity categories 1A or 1B of the GHS). Section 5 (3) of the German Occupational Medical Care Ordinance (ArbMedVV) requires employers to offer follow-up preventive medical care to their current and former employees in accordance with the Annex of the ordinance following termination of certain tasks which may lead to health disorders after longer latency periods.



the end of 2017. The anticipated numbers of cases of 30 mesotheliomas and 50 lung tumours are expected to have been reached by that time.

Parallel to this activity, new biomarker assays are being developed within the MoMar project. A range of markers have already been verified on tumour and control samples from Australia, Mexico and Greece. Combinations of the new assays, such as calretinin and the established marker mesothelin, have proved promising. Measuring of marker levels in the MoMar samples is to be completed in early 2018. One to two years are foreseen for comprehensive statistical analyses.

The use of MoMar is not limited to the existing markers. With storage of MoMar samples in the biobank, MoMar constitutes an important resource for future occupational medical research. Because no new cohorts need to be created, validation of new markers or other detection methods will be much faster in the future.

BIOBANKS: THE IMPORTANCE FOR PREVENTION

A comprehensive institute-wide concept for a biobank is currently being implemented at the IPA.

THIS CONCEPT PROVIDES:

- Central and remote storage of samples
- Automated storage in liquid nitrogen
- Use of standardized protocols
- A central biobank IT architecture

With implementation of this concept, a high-quality research platform for molecular epidemiological and occupational medical research has been created. This platform is to enable statistically validated conclusions to be reached with respect to associations between disease characteristics and the onset of disease using large collections of biomaterials and data that have been collected over many years. An independent biobank also forms the basis for national and international networking with other occupational medical projects and biobanks.

In summary, the IPA has created the foundation for the development of powerful, minimally invasive biomarkers to be used in follow-up preventive care. As a result of previous projects, the IPA has identified an adequate number of new marker candidates on several molecular levels that are currently verified and will subsequently be validated in the MoMar study collective.

In order to solve these and future problems, large collections of biomaterials and associated data are required that have been generated prospectively and maintained over many years under standardized, quality-assured conditions. This goal will be attained by the sustainable development of the IPA biobank. ●

DGUV VORSORGE

A common portal hosts organization and documentation of follow-up occupational medical prophylaxis at the DGUV.

Work-related illnesses including formally recognized occupational diseases frequently do not occur until long after the occupational exposure has ended. Employers therefore have a statutory obligation in Germany to ensure appropriate occupational medical prophylaxis, which under certain conditions must continue to be made available long after the period of employment has ended. The German Social Accident Insurance Institutions support satisfaction of this obligation by maintaining a number of institutions that ensure the occupational medical prophylaxis of insured individuals following exposure to carcinogenic substances and effects, both during and beyond the period of employment. These institutions, established many years ago, include the GVS preventive healthcare body, the ODIN organizational service for post-exposure examinations and the BG BAU's ASD occupational medical and safety service.

As of 2017, the provision of follow-up occupational medical prophylaxis by all organizational services and facilities within the German Social Accident Insurance has been grouped under the umbrella of "DGUV Vorsorge".

DGUV Vorsorge serves as a common portal for the existing organizational services for the provision of preventive medical care. It permits needs-based organization and documentation of the relevant measures. Follow-up preventive medical care is organized from a single source in compliance with uniform standards and with optimum leverage of synergies in the interests of the insured individuals, the companies and institutions insured by the accident insurance institutions, and the accident insurance institutions themselves.

DGUV Vorsorge offers the insured companies and institutions the facility of central reporting

independent of the reason for the preventive medical care measure or the nature of the historical exposure to carcinogenic substances. Any party using the central exposure database (ZED) can, if desired, link

the report to the ZED to that for follow-up preventive medical care.

DGUV Vorsorge offers the insured individuals optimized organization of preventive medical care irrespective of the reasons for it, together with quality-assured documentation in compliance with harmonized data privacy standards. ●

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DGUV VORSORGE: PREVENTIVE MEDICAL CARE FOR AROUND 500,000 INSURED INDIVIDUALS

Some half a million insured individuals who were exposed during their work for example to dust containing asbestos, silicosis-inducing dust, synthetic mineral dust, or other carcinogenic or mutagenic substances or mixtures receive follow-up preventive medical care in accordance with Section 5 (3) of the ArbMedVV from the relevant services of the German Social Accident Insurance Institutions. Employees exposed to radiation also benefit from this provision in accordance with the German X-Ray Ordinance (RöV) or Radiation Ordinance (StrahlSchV).

BIOMONITORING FOR PREVENTION

Biomonitoring can be used to detect hazardous substances or their metabolites in the human body. The method is a recognized part of occupational medical prophylaxis and the regulations governing it.

Human exposure to hazardous substances may occur through contact with them in either an occupational or private context. Hazardous substances may for example enter the body through the air, foods, cosmetics or consumer goods. Biomonitoring generally involves the detection of these substances or their metabolic products in human blood or urine. For the purposes of prevention, biomonitoring is an important method for the evaluation of task-related or workplace-related exposures, and thus also of the efficiency of the

REFERENCE VALUES

protective measures taken. Recommended exposure limits are used for this purpose, such as biological limit values in the sense of the German Hazardous Substances Ordinance or, in the case of carcinogenic substances, biological equivalence values for the acceptable and tolerable risks in accordance with the technical rule 910 (TRGS 910). For carcinogenic substances in particular however, few limit values have been available to date that could be used for assessment of work-related exposure. In this context, use of so called reference values can be used to assess occupational exposure.

Reference values mirror the background exposure of the wider population. In Germany, the Permanent Senate Commission for the Investigation of Health Hazards of Chemical Compounds in the Work Area sets reference values for hazardous substances in biological materials (BAR values) and the Human Biomonitoring Commission of the Federal Environmental Agency sets RV95 values, in accordance with defined criteria. Both approaches require representative collectives from the general population with comprehensive supporting epidemiological data. The IPA is currently studying exposure to a wide range of substances. These studies are being performed on a large collective of older persons (the Heinz Nixdorf Recall Cohort) and in the German Environmental Survey (GerES) on the health of children and adolescents, conducted by the Federal Environmental Agency.

Within the IPA, biomonitoring experts are working closely together with the Competence Centre Epidemiology. On the one hand, the teams are studying factors influencing the exposure and on the other, associations between exposure to hazardous substances and diseases in the general population. In addition, the IPA is currently preparing joint activity with the NAKO (national cohort) study. A prospective health study involving 200,000 test subjects, NAKO has the objective of yielding a better understanding of diseases such as cancer, diabetes, dementia and heart attacks. NAKO is also intended to enable up-to-date reference values for Germany to be set.

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▼ Human biomonitoring detects traces of hazardous substances in the body



GAPS IN KNOWLEDGE

Preventive activity normally follows the STOP principle: substitution, technical protective measures, organisational measures, and personal protective equipment. In accordance with this principle, measures for substitution have first priority, i. e. hazardous substances at workplaces are to be replaced by less harmful substitutes. However, the substances that are presumed to be less harmful have often not been studied any more closely than those originally used. Gaps in knowledge also exist for hazardous substances that have been in use for many years, or biomonitoring parameters have not yet been established for them. In order for new biomarkers to be used, the metabolisation, uptake, distribution and accumulation of these substances must be clarified, as must the contribution made by the uptake routes – ideally on human beings. The particular conditions at the IPA are well suited to this activity. Studies in the exposure laboratory for example enable metabolic and toxicokinetic core data to be obtained on the dermal uptake of hazardous substances from the gas phase, as well as on their purely inhalative uptake.

IN-VITRO SYSTEM

Studies are also performed at the IPA on humans following oral administration or dermal application. Where this is not possible for ethical reasons, for example for substances classified as carcinogens, recourse is made to the results of joint national and international studies performed on animals. Alternatively, in-vitro test systems are employed. One such in-vitro system in the area of human biomonitoring has been established for study of the skin-penetration properties of hazardous substances. This system enables these properties to be studied by a standardized and quality-assured procedure under controlled conditions.

In the field, biomonitoring delivers valuable information on whether action needs to be taken to reduce the exposure of particular individual workers to hazardous substances at the relevant workplaces. Biomonitoring also shows whether the occupational safety and health measures taken are having the desired effect. In short, biomonitoring is a primary prevention measure for ensuring the good health of individuals at the workplace. ●

▲ Ultratrace analysis in the IPA's human biomonitoring laboratory

SKIN PENETRATION BY HAZARDOUS SUBSTANCES

The IPA investigates the different conditions by which hazardous substances are taken up by the skin.

Hazardous substances at the workplace can enter the body by a number of different routes, including through the skin (percutaneous absorption). Via this route alone, or in combination with other routes, for example inhalation, such absorption may lead to toxicologically relevant concentrations in the blood. These

quantities may be of relevance to workers' health, in particular in the event that workers come into contact with hazardous substances that are readily

soluble in both water and organic solvents. Typical examples include N,N-dimethyl formamide, N-alkyl pyrrolidones and dimethyl sulfoxide, which are used in the plastics and automotive industries. Hazardous substances that do not normally penetrate the skin owing to their physical and chemical properties may actually enter the body through the skin with the aid of solvents. This particularly applies to lipophilic hazardous substances.

BIOMONITORING

A major goal of the IPA is to obtain a comprehensive picture of the percutaneous absorption

of hazardous substances at the workplace. To achieve this, the institute's researchers are conducting studies in relevant and typical workplace scenarios. Studies in industry involving biomonitoring, i.e. detection of the hazardous substance in human body fluids, are particularly conclusive. Factors specific to the individual that may facilitate percutaneous penetration, such as damage of barrier integrity caused by wet work, are not generally assessed. This also applies to the potential influence of skin care products used at workplace or during leisure time.

IN-VITRO METHODS

To evaluate percutaneous absorption, the IPA's researchers make use of in-vitro methods in accordance with the current OECD guidelines. These include studies involving Franz cells, in which absorption of a hazardous substance following dermal application can be measured. These studies yield preliminary indications of the quantity and kinetics of the penetrating substance. The Franz cell chamber can be used for carcinogenic and mutagenic substances. With these methods, the IPA was able to demonstrate for the first time the percutaneous absorption of phenyl-2-naphthylamine (P2NA), a lipophilic hazardous substance, and to verify its penetration under conditions relevant

to workplaces, such as during its use in the printing industry for the cleaning of rubber blankets. The research team was also able to demonstrate the storage capacity of the skin: owing to its high lipophilicity, P2NA accumulated in the deepest skin layers, from where it was continuously released. Extrapolation of these results to humans means that the substance continues to enter the bloodstream from the hypodermis even once the external source of exposure has been eliminated.

EXPOSURE LABORATORY

The IPA also investigates the direct percutaneous absorption of substances in the form of vapour in the ambient air. In studies conducted in its modern exposure laboratory, the IPA demonstrated that humans absorb the aromatic amine aniline from the air directly through the skin. The results show that standardized, quality-assured studies, both in vitro and in vivo, are effective in order to clarify issues relevant to industrial practice concerning the percutaneous absorption of hazardous substances. The IPA is able to adapt the study methods to the relevant workplace conditions, and consequently, IPA employees make valuable contributions to hazard and risk analysis concerning contact with substances absorbed percutaneously. ●

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FOCUS ON INDOOR ALLERGENS

Many people spend most of their time indoors, to a large extent at their workplaces. This "western lifestyle" has been associated with an increase in allergic diseases.

Around 18 million Germans, over 40 percent of the country's working population, spend their working days in offices. Consequently, people both live and work primarily indoors – and increasingly suffer allergic diseases.

SOURCES OF ALLERGENS

In Europe, the most common indoor sources of allergens causing reactions of the upper and lower respiratory tracts are:

- The house-dust mites *Dermatophagoides pteronyssinus* and *Dermatophagoides farinae*
- Cats
- Dogs

Current German studies with a population-based cohort of more than 7,000 adults showed a sensitization prevalence of almost 16 percent against *D. pteronyssinus*. This indicates that the house-dust mite is the most significant indoor allergen, followed by dog dander and cat epithelia, each at seven percent. Significantly less frequent is a sensitization to mould.

INDOOR EXPOSURE

Humans may come into contact with these indoor allergens not only in living areas, but they might occur also at the workplaces. This raises the question about

the level of exposure in offices compared to that in living areas. For several years immunological methods have been available to quantify the concentrations of the major allergens. Most of the studies, especially those for exposure to mite allergens in the domestic area, measured the allergen concentration in dust vacuumed from mattresses, furniture surfaces or floors. The IPA has developed a sensitive method for quantifying mite allergens in airborne dust samples. The method is based on polyclonal antibodies and detects not only the two major allergens of the *D. farinae* mite, but also numerous other allergens of this and other mite species, which are grouped as "domestic mites". Therefore, this newly developed immunological method is a valuable tool to measure airborne "domestic mite" allergens.

PILOT STUDY

In order to assess the mite exposure on the one hand and the importance of the transfer of cat and dog allergens from outside into the offices on the other hand, the VBG has conducted a pilot study together with the IPA. Five office buildings in Hamburg and Berlin were studied, together with the living areas of the workers. Four times a year, electrostatic dust collectors were used

to collect over 800 samples; in addition, over 400 dust samples were collected in the same offices by vacuuming of the carpet. The result: the offices were considerably less exposed by mite allergens than the households of the employees. A longer standing after renewal of the floor and also daily customer contact increased the mite allergen concentrations in the offices. Although neither dogs nor cats were kept in the offices studied, substantial transfer of dog and cat allergens into the offices was demonstrated. This was particularly the case where workers who had pets at home were employed. However, the concentrations of allergens in the offices rarely reached such high levels as in the office workers' homes with pets. From the study, recommendations for practice can be derived to reduce allergen exposure in the workplace. ●

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PREVENTION OF PARTICLE-INDUCED LUNG DISEASES

Contact with particles may present a considerable danger to health. This is a focus of the IPA's prevention research activity.

Prevention research at the IPA is intended to contribute to materials presenting a risk being identified robustly and occupational exposure limits being set. The researchers also study the mechanisms of action of particulate hazardous substances, and whether nanoparticles have a greater effect than microparticles.

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INFLAMMATION MARKERS
 Inhalation of particles and fibres may cause chronic inflammation to develop in the human lung. The resulting inflammatory cells in the lung can be detected by a bronchoalveolar lavage (BAL); however, this involves a resource-intensive procedure that is also

very unpleasant for the individuals concerned. One focus of the IPA's research activity therefore lies upon identifying inflammatory markers obtained by minimally invasive means, for example from the induced sputum, that indicate toxic particle effects reliably and at an early stage.

ZINC OXIDE HUMAN CLINICAL TRIAL

Zinc oxide is a substance with a wide range of applications, for example as an anti-corrosion agent. During working of hot-dip galvanized steel sheet, zinc oxide particulate may be released and inhaled by workers, causing harm to their health. In 2009, the MAK Commission of the German Research Foundation (DFG) proposed that the limit for zinc be lowered substantially. The recommendation was based upon a study in which no effects of zinc oxide were observed in humans.

⇓
One focus of the IPA's research activity therefore lies upon identifying inflammatory markers obtained by minimally invasive means.
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Meaningful human data indicating the workplace concentration above which health effects occur were however not available. At the request of regulatory bodies, a more advanced inhalation study involving zinc oxide nanoparticles was therefore performed at the institute for the purpose of review of the MAK recommendation. Increases in body temperature and in a range of inflammation parameters in the blood were observed in the test subjects in the study as a function of the zinc oxide concentration. With these results, the IPA is contributing to the setting of a suitable health-based occupational exposure limit.

CELL MIGRATION ASSAY
 Human clinical trials of this type must be supplemented scientifically by in-vitro studies. The particle toxicity parameters of pathological significance are examined in human clinical trials,

as are experimental parameters. Studies of adaptive and toxic effects on human beings are subject to considerable constraints, however. The number of different particles is also limited in human clinical trials. Experimental studies on animals in this area, too, involve considerable overhead. Researchers must therefore confine themselves to studies serving as examples. Cell-culture methods can be used to classify the large number of particles and modifications thereof in terms of their hazard potential. Suitable validated methods targeting inflammatory particle effects did not exist before now.

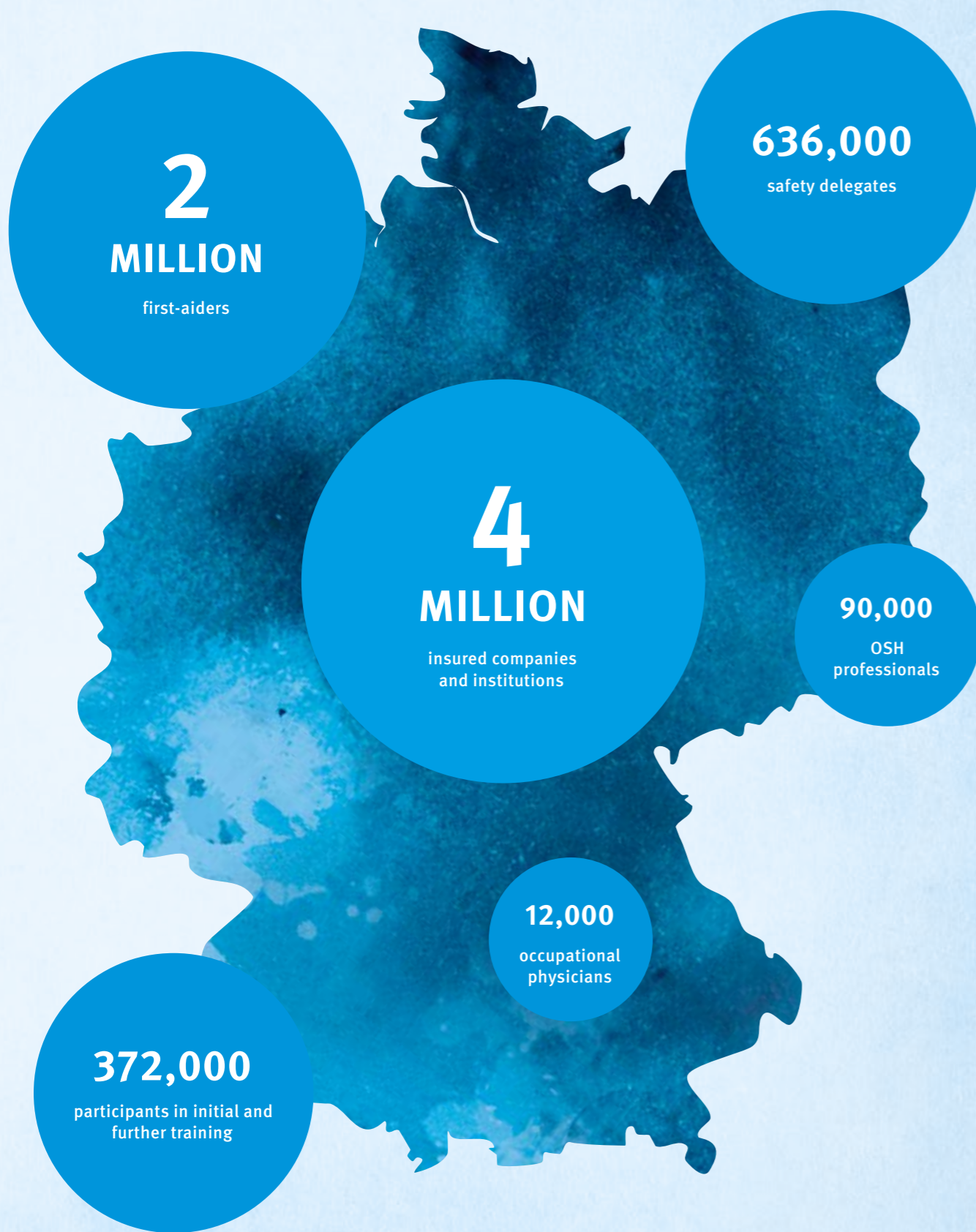
The particle-induced cell migration assay (PICMA) was therefore developed at the IPA for this purpose. The assay models the migration of inflammatory cells into the lung. It exploits the ability of cells to migrate towards biochemical attractants that are

released at the site of inflammation. Preliminary studies suggest that the chemotactic effects in this assay reflect the scale of the inflammatory particle effects that would have been yielded by an assay performed on human beings or animals.

PERSPECTIVES

More advanced studies involving fibres of known and varying strength of effect show that asbestos fibres and multiwall carbon nanotubes have a much stronger effect in the PICMA than the non-fibrous particles studies previously. Zinc oxide also had strong chemotactic effects in vitro. Comparison of the effects observed on human beings following inhalation and in vitro permits conclusions regarding early toxic markers. Altogether, these results enable the researchers to assess the validity of the in-vitro model for human beings. ●

▲ Use of non-invasive methods at the IPA



SAFETY AND HEALTH

The German Social Accident Insurance

Whether at work, in schools or higher education, in children's day-care facilities or in voluntary services: the German Social Accident Insurance offers safety and protection. It is a part of Germany's social insurance system. All salaried employees, schoolchildren and students, children in preschool facilities, and voluntary workers, particularly those in the voluntary fire services, are generally insured automatically against occupational, school and commuting accidents and against occupational diseases. Altogether, around 76 million people in Germany enjoy such protection. The bodies responsible for the statutory accident insurance system are the German Social Accident Insurance Institutions for the public and private sectors, which are organized on sectoral lines and maintain a local presence to serve the insured parties.

PREVENTION

The German Social Accident Insurance has the function of preventing occupational, school and commuting accidents, occupational diseases, and work-related health hazards. Prevention is of decisive importance, and is among the statutory functions of the German Social Accident Insurance Institutions. The individual institutions perform surveillance and consultancy tasks within the sectors for which they are responsible, oriented towards the actual hazard and exposure situations in the field. In addition, they have developed a package of needs-based prevention activities and services in recent years which are cost-effective, practical and efficient.

THE TEN PREVENTION SERVICES OF THE GERMAN SOCIAL ACCIDENT INSURANCE INSTITUTIONS

1. Incentive schemes
2. Consulting (on request)
3. Supervision by occupational physicians and OSH professionals
4. Investigation
5. Research, development and model projects
6. Information and communication
7. Testing and certification
8. Bodies of regulations
9. Training
10. Surveillance, including circumstantial consulting

THE DGUV

The DGUV (German Social Accident Insurance) is the umbrella association of the German Social Accident Insurance Institutions for trade and industry and for the public sector. It represents the common interests of its member institutions and supports their tasks in the interests of both the companies and the insured individuals. It represents the accident insurance institutions in their dealings with policymakers, German (federal and regional), European and other national and international institutions, and with the social partners. It maintains a head office in Berlin and further offices in Sankt Augustin and Munich. It also maintains institutes and academies at sites in Bad Hersfeld, Bochum, Dresden, Hennef and Sankt Augustin.

In addition, the DGUV is active in KAN, the Commission for Occupational Health and Safety and Standardization, which is funded by the VFA, the Association for the Promotion of Occupational Safety in Europe.

ORGANIZATION STRUCTURE AND CONTACT DETAILS

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(As at September 2017)

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