Answers to pending VoxR questions

Conference keynote and Session 1

Conference keynote: The end of work as we know it... new work & new society (Michael Beilfuss, IDG Media)

- **All technical norms and legislation, often, are so far apart. How should it be possible to make this relationships easier?**
  M. Beifuss: OSH and digitalisation can potentially go hand in hand. New technologies do not only create opportunities to „embed" safety in a more comprehensive way to systems, machines, work environments. More than this, digitalisation opens new ways of reaching out to the „hearts & minds" of workers and executives in companies. a good example: the social media campaign of the DKMS (https://www.dkms.de/de/ueber-die-dkms). The German foundation fighting blood cancer gives a great example for how to utilise the various channels of social communication to promote stem cell donation and typing.

  From the perspective of an „OSH outsider" and a conmunications professional, I would clearly recommend to use social media (amongst other channels of communication) to create broader awareness for and involve additional target groups with the OSH topic.

- **How is education changing or how should it change to face this new trend?**
  M. Beifuss: I am convinced, that education is one of the keys (if not, THE key) to deal with the challenge of digitalisation. Most of the „traditional school systems" – in particular in Germany – neither focus on „digital skills and mindset" nor utilise the respective technologies in order to provide knowledge. Additionally, the concept of „life-long-learning" is closely associated with the digitalisation.

  The „education opportunity" starts with parents & pre-school and ranges to companies when providing digital training for seasoned or older employees.

Session 1: Smart and new technologies and workers' safety

New digital production technologies - Challenges for machinery safety standardisation (Gerhard Steiger, VDMA)

- **How do you ensure that your standardization is up to date in the current rapid developments of individual technologies as the standard is issued?**
  G. Steiger: Rather trying to specify performance based objectives in standards (i.e. regarding safety) than prescribing individual technologies as such. This will on one hand not hampering the development of new technologies and on the other hand will not be outdated over a short period.

- **In the VDMA video there are no workers! Are they important and what are the risks for them?**
  G. Steiger: The video is dealing with the establishment of necessary communication standards for enabling smart manufacturing, only. However, even new smart manufacturing technologies will not function completely without workers. The risks for them will be most probably less severe compared to now because they will have more tasks in supervising the functioning of the processes.

- **What about the interaction between machines and workers, machines and PPE?**

G. Steiger: See response to question above; for the interaction between machines and workers (collaboratives machines/robots) some accepted examples exists already, which are all based on an individual risk assessment (will be supported by standardisation activities, too); regarding the role of PPE for new technologies I am not an expert.

- **Is VDMA / NAM involved in the revision of the product liability directive (IT security aspects, burden of proof)?**
  G. Steiger: Yes, VDMA is following actively all developments on political level being relevant for the machinery sector (the upcoming revision of the Machinery Directive 2006/42/EC has priority for VDMA)

- **How can we use IT safety to improve consideration of risks such as noise and chemicals exposures due to machines (often related to lack of ventilation)**
  G. Steiger: Sorry, I do not understand this question.

- **Is there a different approach between the EU and the rest of the world, especially the US?**
  G. Steiger: Regarding the implication of IT (cyber) security on (machinery) safety there seems to be a common international approach (ISO/TR 22100-4 has been taken over identically as ANSI standard in the US)

- **How long a manufacturer should be required to give support to the customer regarding IT security system, e.g. regular updates etc.? For all lifetime of machinery?**
  G. Steiger: The manufacturer should of course provide such a support. The intended lifetime of the machinery would be an orientation for the duration of such a support. Finally, the decision on the duration will be up to the legislator and/or the contract between the manufacturer and his client.

- **@Steiger: Are maintenance operations included in the standards discussion? 22100 part 4, why a TR not a standard?**
  G. Steiger: Only few aspects with regard to maintenance (e.g. remote/tele service) are covered by TR 22100-4; the document is providing first general guidance on the subject but is not specifying proven state of the art requirements. Therefore, it was published as a TR and not as a standard.

- **Will Security be a task for future information for use?**
  G. Steiger: Yes, the manufacturer should provide appropriate advice on IT security aspects via "Information for use" to the machine user (the just published ISO 20607 "Safety of machinery - Instruction handbook - General drafting principles" contains in clause 4.11 a references to TR 22100-4).

- **Do you have a common language in electrotechnical and mechanical standardisation?**
  G. Steiger: With regard to safety to a very large content (both sectors are committed to ISO/IEC Guide 51).

- **How do the physical limits from ISO 21260 differ from ISO / TS 15066?**
  G. Steiger: Sorry, I cannot answer this question, as I am not so familiar with the content of both documents.

- **What about responsibilities for safety: is it the software or the manufacturer of machinery?**
  G. Steiger: The final responsibility will lay with the manufacturer when he is incorporating via components software in his machines.

- **How does the working group on robotics plan to address the issue that standards are currently focused along domains (e.g. healthcare, manufacturing, etc) but robotics as multipurpose machines blur the distinctions more and more?**
  G. Steiger: Sorry, I cannot answer this question, as I am not so familiar with the discussion in ISO/TC 299 "Robotics" about this topic.

- **How to standardize an artificial intelligence?**
  G. Steiger: According to my personal view artificial intelligence (AI) as such could/should not be standardised. What can be a task for standardisation are the necessary conditions under which AI can be safely used for machinery

- **@Steiger and Podgorski: Can you learn from each other with regard to data protection and cybersecurity?**
  G. Steiger: As cybersecurity and data protection are phenomena with relevance across many different sectors we can of course learn from each other. The conference in Dresden has provided some valuable input for

- **Are you discussing ethical aspects of digitalization?**
  G. Steiger: Not directly in the standardisation community where I am active. However, the results of other bodies (e.g. EU High level expert group on AI) should be considered for further standardisation activities.

Personal data protection and cybersecurity issues with regard to the design and use of smart PPE (D. Podgórski and G. Owczarek, CIOP-PEB)

- **The GDPR can be correctly applied by a manufacturer of smart systems, the problem is we miss a standard or a third party certification to prove the product sold is fine. This is a need which is different from cyber security. Any work done in this sense?**
  D. Podgórski / G. Owczarek: It is not yet clear yet whether a special smart PPE certification will be needed with regard to GDPR requirements. At this stage, manufacturers of such products should clearly indicate what are the functions of the smart PPE system that ensure the protection of personal data in accordance with the GDPR. Demonstrating this compliance will be crucial for the dissemination of these products and their acceptance by end users.

- **Does every worker have to agree for his medical data to be analysed by an employer? And if not?**
- **Health data are sensitive data. How is this possible to be treated taking into account GDPR?**
  D. Podgórski / G. Owczarek, ad. 2 & 3: Every employee has the right to refuse to collect and analyse his or her medical data by the employer. So far, there are too few cases of using such systems and it is not known what will be the practices and future regulations in this area.

- **Freely given consent : is an employee free to say no to the employer to use the smart PPE data?**
  D. Podgórski / G. Owczarek: According to GDPR, every employee may disagree. So it is a matter of training and convincing the worker that the use of smart PPE will be beneficial to him or her.

- **Can you learn from each other with regard to data protection and cybersecurity?**
  D. Podgórski / G. Owczarek: If I understand the question correctly, it is obvious that experts in smart PPE security can learn from machine security experts and vice versa.

The technical measures, methods and good practices for ensuring cyber security in machines and smart PPE systems are similar.

- **Users can choose not to allow the data processing. If this is so these systems are useless...**

- **Do you think that although there is the problem of data protection smart PPE have a future?**
  D. Podgórski / G. Owczarek, ad. 6 & 7: I think that in the future, many employees will see the benefits and agree to the processing of data collected by smart PPE. Thus, in the future, these systems will be widely used. But there will certainly also be groups of workers or trade unions who do not agree to use such systems.

- **How does Smart PPE measure hormones? How can hormones be detected without blood sampling?**
  D. Podgórski / G. Owczarek, ad. 8 & 9: Sensors that measure adrenaline levels in human sweat in real time are already being developed and tested. Here is a link to an exemplary solution: https://patents.justia.com/patent/20180279930

- **Do you know if workers are involved when employers introduce smart PPE in their company?**
  D. Podgórski / G. Owczarek: Some studies carried out several years ago during the pilot implementation of the smart PPE system for firefighters have shown that firefighters are in principle interested in such new solutions and are willing to participate in the tests. Further dissemination of these systems will certainly depend on the proper involvement of employees in the design and testing process, so that the new systems are useful and acceptable.

- **In-group protection in hazard area how do you protect person not wearing the smart PPE?**
  D. Podgórski / G. Owczarek: In such cases one should always apply a standard hierarchy of protective and preventive measures in place, with engineering and administrative measures taking precedence over the PPE.

- **Smart PPE versus operator control?**
  D. Podgórski / G. Owczarek: If I understand the problem correctly, smart PPE can be used to ensure the safety of machine operators for example by transferring data about the location or health status of the operator to the respective safety system of the machine.
- **Can smart PPE be certified like „normal“ PPE or how do you manage certification?**
  D. Podgórski / G. Owczarek: Smart PPE should be certified as “normal PPE”, but it should be taken into account that ICT components used in these systems will be subject to additional certification, such as compliance with the EMC Directive or with future cybersecurity certification scheme.

- **How can we link risk reduction provided by smart PPE with safeguarding designed in the machinery and use of digital technologies?**
  D. Podgórski / G. Owczarek: Smart PPE systems can be integrated with machine control systems and other collective protection measures. For example, detecting harmful substances in the air detecting a worker’s proximity to the hazardous area may trigger risk-mitigating protection systems, such as activating ventilation systems, generating warning signals or activating safeguards to block access to hazardous areas.

Innovating the work system on construction sites (Stefano Boy, ETUI)

- **How can we link the three levels of risk management if the legislation in Europe divide them?**
- **Shouldn't we also consider a 4th Risk Management level as to how the instructions will be actually implemented by the workers?**
- **Communication on Management items via CEN SABOSH?**
- **What is your proposal how to coordinate presented three risk managements processes?**
- **How to bring together DG Grow and DG Employment?**
- **Do you think labour inspectors in EU are equipped to deal with the new technology?**

Milk-run trains - an idea of the past with a future (Marcus Gaub, BGHW)

- **Is there any TC dealing with the new technologies of autonomous machineries?**
  M. Gaub: For the industrial truck side it is ISO TC 110/SC 2/WG2. A final draft for ISO 3691-4 is in preparation and should be available in 2020 (Industrial trucks - Safety requirements and verification - Part 4: Driverless industrial trucks and their systems (ISO/DIS 3691-4:2018)
- **What are the drivers doing instead of driving the milk run train in future?**
  M. Gaub: In fact, their task will change from driving to supporting and loading the trains. But a certain percentage is obsolete that is the result of automation.
- **Do you expect the old milk run trains to die out?**
  NA
- **How can trains can be improved to reduce vibrations and thus back health problems?**
  M. Gaub: Concerning milk-run trains there is no high stress caused by vibrations since they are normally operated on firm and level ground. There is the possibility to use some vibration absorbing material as cover for the operator stand on platform and to use SE tyres on the tractor.
- **Do you think that replacement of the milk run trains by computers and artificial intelligence will solve all of the safety problems?**
  NA

Self-healing polymers - an innovative solution extending the service life of protective gloves (Agnieszka Adamus-Włodarczyk, A. Bacciarelli-Ulacha, CIOP-PIB)

- **How can it be verified that the self-healing process is done correctly?**
- **Are there already self-healing products on the market?**
- **Is there an interest of manufacturers in this self-healing process?**

- **Is using self-healing materials safe for the user? Workers can think that they are protected even when they are not, because a cut was too big for self-repair.**

- **Are self-healing transparent (infrared) polymers possible / available?**

- **Will it be possible to easily test the effect of self-healing polymers (think about certification by a notified body)?**

Light has non-visual effects - also at the workplace (A. Damman, KAN)

- **How can you control non-visual effects of light?**
  A. Damman: The effects of light depend on many factors, such as:

  - *Light spectrum: especially light in the blue spectral range is effective*
  - *Illuminance: the higher the illuminance at the eye, the higher the potential of light to produce effects*
  - *Duration: longer exposure may produce stronger effects, but saturation effects may also occur*
  - *Timing of the exposure: light in the morning can stabilize the biological clock, light in the evening, such as a quick glance at the smartphone before going to bed, can delay falling asleep*
  - *Prior light exposure ("light history"): the more light you are exposed to on the same day and on the days before, the more stable the biological clock is against disturbances*
  - *Chronotype: the current phase of the biological clock decides whether a light intervention sets the biological clock forward or backward*
  - *Age: with age, the lens discolours, which means that part of the blue spectrum is already absorbed by the lens and can no longer reach the retina*

  These many influencing factors can in turn influence each other, so that it is not possible to say in general which light affects which way. The influencing factors described, only indicate possible tendencies.

- **What do you recommend for the workplace?**
  A. Damman: For pure day work, it is important that sufficient daylight reaches the workplace. Daylight is the best light for humans to stabilize the individual biological clock (circadian rhythm). Employees should also be able to go out during their lunch break. Late in the evening and at night, the blue component of the light should be reduced and unnecessary light sources switched off. For activities that are particularly risky or require increased attention, bright light and/or light with a high blue component can also be used at night to promote alertness and attention. Here in particular, a risk assessment is essential to justify this measure.

  In Germany, two documents should be used to consider the non-visual effects of light (available in German only):
  - *Empfehlung des Ausschusses für Arbeitsstätten (ASTA) – Künstliche biologisch wirksame Beleuchtung in Arbeitsstätten (recommendations of the ASTA which is a governmental committee), saying:*
    use artificial lighting with colour < 4100 K during the night
    continuous lighting of cold light with high illuminance levels should be avoided
  - *DGUV Information 215-220 „Nichtvisuelle Wirkungen von Licht auf den Menschen"*

- **How is exposure to LEDs affecting our biological clock?**

A. Damman: LEDs are not all the same, so the light generated by the LEDs differs. The effect of LEDs on the biological clock depends on the LED used. If an LED emits a lot of light in the blue spectral range, the effects can be stronger. However, many LEDs show a blue peak in their spectrum. Ask the manufacturer for the specific spectrum of the LED you are using.

Light dosimeter - recording an individual's light history (Reto Häfliger, Lucerne University of Applied Sciences)

- **How did the students feel working in this changing daylight?**
  R. Häfliger: Two things are to be noted:
  - *Daylight has top priority. Artificial light cannot replace daylight because artificial light does not have the same characteristics. Artificial light can be helpful in complementing daylight.*
  - *The students were students of interior design. Their work includes assessment of colours and materials.*

  Most students did not notice the changes occurring in the course of the day. This happens when the changes follow the natural changes. It is good when it goes unnoticed. One thing that was noticeable, however, was the difference in colour perception. When students worked during the night and assessed their work in the morning, the colours looked different under different colour temperature. This was a disturbing factor for the students - but on the other hand, a good experience, as it shows that you need to control the light if you want to assess colours and materials. "

- **Are there studies on the influence of light history for people who moved from a sunny southern country to a northern one and vice versa?**
  R. Häfliger: Not that I know of. There are very few studies dealing with the light history. There are studies into vitamin D production in humans who have moved from southern countries to the north, as daylight (UV) is required for vitamin D production. People from the south needed more UV to produce the same amount.

- **Is all the effect via the eye, i.e. is there any effect on fully blind people?**
  R. Häfliger: There are a few studies on this aspect. For example:
  Gilles Vandewalle et al., Blue Light Stimulates Cognitive Brain Activity in Visually Blind Individuals, Journal of Cognitive Neuroscience, Volume 25, Issue 12 ,2013, p.2072-2085"

- **Why is it necessary to wear the sensors 24 hrs a day? Why at night?**
  R. Häfliger: Light dictates the rhythm of the inner clock. Darkness during the night is however just as important as the right light during the day. Darkness dictates the rhythm as well. Without darkness during the night (mobile phone, light shining through the window), the synchronising effect of light during the day is less effective. This is why the whole 24 hours over a longer timespan are relevant.

- **Which part of the spectrum must be measured?**
  R. Häfliger: The objective is to follow the new CIE standards (CIE S 026/E:2018, CIE System for Metrology of Optical Radiation for ipRGC-Influenced Responses to Light). The sensitivity of the five photoreceptors in the range from 380nm – 780nm – this is the relevant range for research into the non-visual effects of light. Some findings suggest that the photoreceptors do not function independently, but influence one another.