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PARTNERSHIP FOR EUROPEAN RESEARCH IN OCCUPATIONAL SAFETY AND HEALTH

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New technologies as a field of action for OSH

Summary

The emergence and rapid development of new technologies are changing the working conditions and working environment. New technologies have a lot of potential to deal with existing and well-known OSH questions such as e.g. the design of the man-machine interface, the real time monitoring of work environment parameters. Simultaneously, new technologies stimulate research in a number of new domains of scientific development such as the development and application of smart and functional materials. Challenge is to reduce possible OSH risks at an early stage by usage of these new technologies. Moreover the development of new technologies may lead to the emergence of new hazards and risks and overrule known solutions. Research should therefore support the development of a common European position with regard to new technologies and OSH in order to anticipate the possibilities and consequences of technology implementation.

Deliverables

- Identification of OSH-relevant issues and opportunities of new technologies and a technology impact assessment, in order to anticipate the consequences of technology implementation at an early stage, based on scientific findings.
- Development of a common European position regarding new technologies and OSH, allowing a joint, goal-oriented impact on European technology research and development. This challenge involves a special opportunity to influence these new technologies by preventive actions during the design of the technology before widespread introduction into the world of work.
- Practical guidelines should be derived in a second step to support the implementation of new technologies/WAS in European enterprises. Scientific findings in this area should also function as a starting point for the further acquisition of external funding.

[1] *European Foundation for the Improvement of Living and Working Conditions. Telework in the European Union, 2010. Available at: http://www.eurofound.europa.eu/eiro/studies/tn0910050s/tn0910050s.htm*

[2] *Weiser, M. , The Computer for the Twenty-First Century. Scientific American, 265(3), 94-104, 1991.*

[3] *Nakashima, H., Aghaja H. & Auguso J.C. (Eds.), Handbook of ambient intelligence and smart environments, New York: Springer, 2009.*

[4] *ISO Technical Report No. ISO/PDTR 00248435: Textiles and textile products – Smart textiles – Definitions, application and standardization needs, International Organisation of Standardisation.*

[5] *Riva, Giuseppe; Vatalaro, Francesco; Davide, Fabrizio; Alcañiz, Mariano: Ambient Intelligence. The Evolution of Technology, Communication and Cognition Towards the Future of Human-Computer Interaction. Amsterdam: IOS Press, 2005.*

Further information:
This research challenge is part of the PEROSH report "Sustainable workplaces of the future – European research challenges for Occupational Safety and Health". The full report, as well as each of the research challenges separately, can be downloaded in pdf-format from the PEROSH website: http://www.perosh.eu/p/OSHresearch2020

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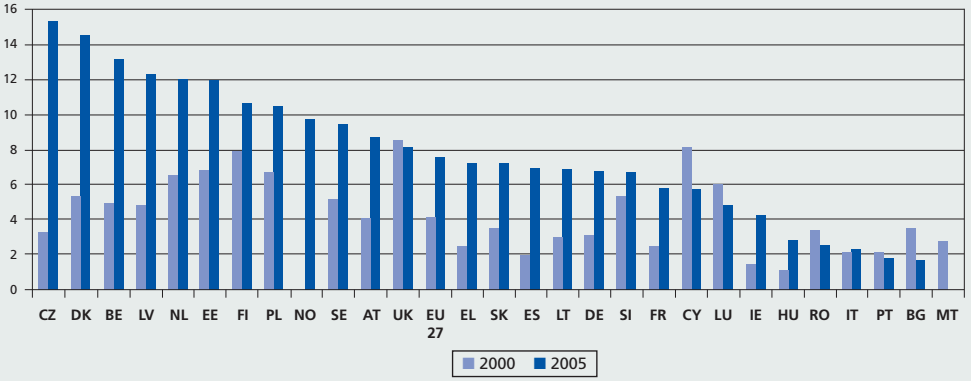
1. Description of the priority. What is at stake? Why is it a priority?

New technologies and concepts are currently changing working conditions (work equipment, environment, man-machine-interaction), based on and triggered by technological progress like miniaturisation, wireless information transfer and high-performance mobile power sources (e.g. measurement sensors and displays in personal protective equipment). This development is illustrated by a study of Eurofound. Based on results of the EWSC in 2010[1], the use of telework (including new ICT applications and other forms of electronic collaborative working) is steadily growing in the European countries and leads to new possibilities but also to a differentiation in OSH risks.

These technologies, their impact on every day life and on the working environment are addressed by research programmes like "Information and Communications Technology" (ICT), "Ambient Intelligence" (AmI), "Ambient Assisted Living" (AAL) or "pervasive computing". All these programmes are based on a technological vision of ubiquitous computing primarily described by Mark Weiser[2]. It embraces activities of research and development using networks of sensors, processors and agents to enhance private and working environments by automated, unobtrusive and adaptive features, and is helping users to reach their goals. In summary, current research on new technologies focuses on the development of the technical components (e.g. sensors, actuators) and questions regarding safety and health that have not been addressed up to now.

Figure 1. Development of telework in the EU27 and Norway, 2000 and 2005 (%).



Source: Eurofound, Telework in the European Union, 2010

New technologies leave a lot of scope for OSH-relevant questions, e.g. the design of the man-machine interface. This can range from simple support for the user through to an almost complete automation of functions or practical steps. Due to a considerable lack of knowledge regarding the impact assessment[3] many countries are currently engaged with research questions like these, focusing on their use as so-called adaptive work assistance systems (WAS, e.g. "smart" products, furniture and environment, equipped with e.g. RFID-Chips). In systematically dealing with the topic as a whole, two different aspects should be considered.

1.1 Possibilities of new technologies for the improvement of OSH

On the one hand, new technologies offer opportunities for new and advanced solutions regarding existing and well-known issues in OSH, e.g. real time monitoring of work environment parameters (exposure to noise, chemical substances, temperature, etc.). Moreover, recent scientific developments in the domain of materials engineering offer many new opportunities for the application of smart and functional materials in the areas which have been perceived so far as dominated by traditional technologies – for example in textile industry (see ISO Technical Report No. ISO/PDTR 00248435[4]). Here it is important to stimulate the application of new technologies in the OSH area, but at the same time to anticipate these opportunities for particular technologies at an early stage of development, to steer their further implementation towards OSH.

1.2 New hazards and risks of new technologies

On the other hand, the implementation of new technologies changes familiar work environments and may thereby in turn lead to the emergence of new hazards and risks and may invalidate known solutions.[5]
To minimise the negative consequences of new technologies on OSH, an early and comprehensive impact assessment is necessary. Once the respective risks of new technical solutions are identified, their development can be modified accordingly to avoid a negative impact on OSH in practice.

2. Research needs at European level

Regarding these two aspects of the challenge, the following research and development topics are needed:
- Adaptation of protective efficiency and the functionality of personal protective equipment to new hazards and changes in the working environment. Intelligent personal protection devices.
- Designing safe workplaces by using virtual reality applications
- Implementation and usability of adaptive wearable IT in work environments.
- Improvement of the quality of air and the acoustic comfort of rooms in the working and life environment by using innovative technical solutions
- Analysis and improvement of OSH for mobile workplaces
- Cognitive aspects of new technology usage
- Technology-mediated influence of user's attitudes and behaviour
- Impact assessment of WAS-controlled work-environments

Research on new technologies/WAS directly follows the activities of Sixth and Seventh EU Framework Programme, not longer focusing on basic technologies but on practical application.
The increasing development and implementation of adaptive and unobtrusive technologies at international level as well as the significant engagement of leading OSH-related research institutes in this topic further emphasise the need to deal with the topic "New technology and OSH" at European level.
Finally, the harmonisation of different international research allows synergy effects and a stronger influence on current technology developments.

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