Humans at the Center: Production in Industry 4.0 Capable of Change

Joint Study of KIT, Leibniz Universität Hannover, and acatech Shows How Companies Are Capable of Change with Industry 4.0 and Emphasizes the Role Played by Human Beings

Successful implementation depends decisively on the staff. (Photo: Manuel Balzer, KIT)

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After the steam engine, conveyor belt, and computer, industry is now facing the fourth revolution: Digital networking of facilities enables companies to better adapt their products to the wishes of customers. This requires systems capable of change, which adapt to changing situations. A joint study published by Karlsruhe Institute of Technology (KIT), Leibniz Universität Hannover (LUH), and the National Academy of Science and Engineering (acatech) reveals, however, that capability of change crucially depends on the staff. Virtual-reality applications and "learning factories" can help the staff build up comprehensive system understanding. Results and best practices will be presented by acatech, KIT, and LUH on April 26, 2018 at the Hannover Messe.

Modern information and communication technologies, such as sensors or data communication systems, interconnect individual facilities at globally distributed locations to smart factories. Digitization and the technical solutions of Industry 4.0 enable companies to meet individual wishes of customers at the costs and within the terms usually encountered in large series production. "But this new flexibility does not only have advantages," Gisela Lanza, Professor and Head of the wbk Institute of Production Science of KIT, says. "A larger diversity of

products, shorter product lifecycles, and volatile demand lead to unforeseeable market changes to which the companies have to react." To be successful and economically efficient in such a volatile environment, companies have to adapt their production systems and networks to market conditions at low cost and within shortest periods of time. Successful implementation of such a capability of change does not only depend on the technical aspects of facilities, Lanza explains. "Dynamic organization will only be successful, if the employees have the necessary competence and flexibility. The readiness to react to changes is an important aspect of the capability of change." Hence, the study of KIT, LUH's Institute of Production Systems and Logistics (IFA), and acatech focused on how companies can make humans the center of structures capable of change and how Industry 4.0 can help them doing this. The basis was a close exchange of experience with the representatives of industry, associations of employers and employees, politics, and science.

The Human Being in the Center of Structures Capable of Change

The study reveals that employees decisively contribute to the successful implementation of the capability of change: They initiate and push reactions to internal and external changes of production and their environment and "live" the change of organization and work conditions. "Employees will quickly accept new tasks and make qualified decisions in any situation only, if they understand the relevant relationships in the system and see the advantages of the changes for themselves and their direct work environment," says Peter Nyhuis, Professor and Head of the IFA. Digital assistance systems can help build up comprehensive system understanding. Industry 4.0 applications, such as virtual reality, help to digitally experience and understand changes. In his opinion, it is very important to enhance trust in new systems: "Companies should focus on reasonable changes in order to reduce fears and concerns of the employees with respect to new, so far unknown tasks."

Dynamic and Modular Company Organization

Change does not only take place at the level of the employees, also organizational structures are changing. The more complex factories and networks creating added values are structured, the more difficult and complicated is their adaptation. Dynamic and modular company structures may be a solution. Thanks to a flexible organization and technology, employees can plan and manage change. Again, Industry 4.0 applications may provide support. They enable decentralized control of certain parts of the factory or of the entire network. Intelligent assistance systems can make the impacts of changes visible to

the employees. This largely contributes to the efficiency of change: “Implementing the capability of change in all areas and at all levels would not be reasonable, as the additional expenses would be too high,” Gisela Lanza says. “Companies rather have to identify the needs of change for all areas.”

These and other results as well as best practices are described in detail in the study “Wandlungsfähige, menschzentrierte Strukturen in Fabriken und Netzwerken der Industrie 4.0” (Human-centered structures capable of change in factories and networks of Industry 4.0). “We want to support companies identify the needs of their productions and successfully implement the capability of change by technical, organizational, and human means,” Lanza says.

Official Presentation of the Study at the Hannover Messe 2018

on April 26, 2018, 12 to 13 hrs, hall 2, Forum tech transfer

Discussion: Wandlungsfähige, menschzentrierte Strukturen in Fabriken und Netzwerken der Industrie 4.0 (Human-centered structures capable of change in factories and networks of Industry 4.0), in German only

Participants: Konrad Klingenburg (IG Metall),
Professor Gisela Lanza (KIT, wbk),
Dr. Manfred Wittenstein (WITTENSTEIN SE)

About the Study

The study covers three project stages: In a fireside chat, representatives of science, industry, and associations of employers and employees first discussed the impacts of technologies and methods of the fourth industrial revolution on the capability of change of factories and networks. In the second project stage, experts and actors of leading companies and associations of employees reported their experience relating to Industry 4.0 and the capability of change. In addition, they presented their expectations regarding the further development and application of the corresponding technologies. By means of best practices from their environment, they illustrated the extent to which the capability of change is implemented at their companies. In the third project stage, representatives of industry, associations of employers and employees as well as of politics and science discussed the results of the first two phases. In the plenum and in parallel work sessions, they identified different perspectives (e.g. of the supervisory

board, management, trade union, expert planners) as well as prerequisites, opportunities, and risks.

The study "Wandlungsfähige, menschzentrierte Strukturen in Fabriken und Netzwerken der Industrie 4.0" (Human-centered structures capable of change in factories and networks of Industry 4.0) (in German only) can be requested by electronic mail to presse@kit.edu.

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