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Applied Sciences

Internet of Things – Corporate Requirements and Framework of Competencies

Fit für Industrie 4.0

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Topic relevance

The Internet of Things (IoT), Cyber Physical Systems, and digitalization are considered as the most important challenges companies have to face in the upcoming future. Other than new technological approaches, the IoT implies a major change in labor conditions, labor organizations, operational tasks, and requirements of the employees' qualifications. Furthermore, employees will not only control operations along the value-added-chain, but also work on innovations and digital business models - thus creating new value for the customer. However, several questions arise in this context:

- "What exactly are the new conditions, operational tasks, and the future requirements of qualification?",
- "Are there any differences in various occupation groups?",
- "What does this mean for the practical implication?".

Research Question

"What are the future requirements for differing employee groups and what required competencies and training methods are caused by IoT and digitalization?"

Method and Data

1

Method:	expert interviews
Period :	February-March 2017
Interviews:	n=6

2

Method:	quantitative online survey
Period :	November-December 2017
Expected Participants:	n=100

Results

Critical appraisal of existing studies:

Analyzed studies show that all digitizing companies face the urgent need to develop their employees` competencies. Moreover, studies show substantial conformity concerning relevant competencies which include IT and process expertise, dealing with data, interdisciplinary thinking, and lifelong learning.[1] [2] [3]

It still remains mostly unclear which specific competencies will be most important and to what extent.

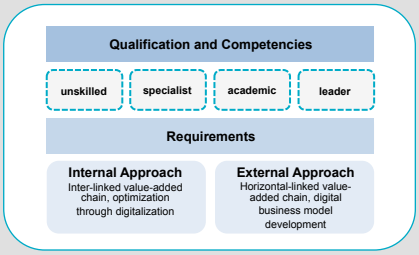
For this purpose, the supposed framework consists of two interconnected levels:

[1] Requirements of internal (e.g. cross-linking of processes) and external digitalization (e.g. new business models, supply chain, and customer relationship management).

[2a] Qualification and competencies dealing with general labor requirements and

[2b] specific tasks of different occupation groups, divided into specialists and unskilled workers, academics and leaders.

Interview-Research-Model



Approaches

internal

Companies put strong efforts into the internal digitalization and the overall process review by the implementation of cross-linked technologies.
Across SAP systems, companies are now working on the implementation of virtual collaborative platforms and assistance systems which indicates an extensive change and challenges - especially in collaboration and organization. This facilitates global collaboration and communication and leads to cost reduction and efficiency.
Thereby, new technologies and devices such as data analytics, virtual and augmented reality, smartphones, and tablets are not yet implemented exhaustively, but developed and tested within pilot projects, e.g. vr-glasses in maintenance services.

external

The degree of cross-linking between companies suppliers and customers is differentiating. It variates from automized supply processes to virtual product configuration for customers.
Most of the interviewed companies are already working on digital and innovative business models on the basis of data analytics and cloud computing by founding digital units and external cooperations.

Qualification and Competencies

According to the previous mentioned requirements in general higher media competencies, life-long learning and social skills are needed regardless of the qualification level.
Unskilled: The perspective for unskilled workers depends on the digital approach why companies do not make a specified statement towards qualification for unskilled yet. If they have a work perspective in the industrial future, they need to have a massive upgrade in qualification or get support by assistance systems.
Specialist: Specialists need a huge increase in methodological expertise on the same level as academics.
Academic: Generally academics are well-prepared for the digital transformation. Nevertheless, particularly IT experts are demanded in the future.
Leader: Future key competencies for leaders are rather social skills than professional expertise. Moreover the ability for delegation and empowerment were mentioned.

Requirements

Employees need to occupy themselves with the consequences of digitalization for their own workplaces on every qualification level. Thereby, the establishment of a digital culture and mindset can be seen as a necessity including knowledge share, openness for change and collaborative work.
Unskilled: On the one hand, work could become easier through digital assistance, so even unskilled workers have employment prospects. On the other hand, automatization limits work, so there is no longer perspective in certain areas. It is not yet decided which approach will be more realistic.
Specialists: IoT machines require ability for team work, communication skills, and autonomy. All interview partners see job enrichment very likely and predict requalification.
Academic: There will be an increase of knowledge project and work which requires creativity, flexibility, capability to work remote and virtual.
Leader: Leadership itself must be changed, so that the digital transformation can succeed. The largest requirement is to empower the employees to participate in the digital change. Thereby, virtual and remote leadership are increasingly important.

Conclusion and Recommendations

Based on internal and external digitalization approaches, complex requirements for different occupation groups arise. However, it is challenging to divide competencies within different groups. Even the companies do not do a sufficient differentiation yet. Therefore, a quantitative survey is needed to clear up and confer structural qualification recommendations.
The requirements and qualification demand for leaders are the most clear ones. Especially social skills and leadership qualities need to be regarded right from the start. Therefore, classical training formats need to be revised constantly and adapted to new digital challenges.

Outlook

A widespread quantitative research on enterprises of the technology network "Intelligent Technical Systems OstWestfalenLippe", is planned at the end of year 2017 in order to precise the results of the explorative expert interviews. Therefore, the qualitative analysis will set up the basis for a valid analysis of further research questions.

The corporate objective is to identify requirements in employee's qualification and further vocational training caused by IoT. Consequently, solid recommendations for an appropriate qualification of different skilled employees will be deduced and necessary institutional conditions will be enunciated.

References:
[1] Ingenics AG, (Hrsg.) & Fraunhofer IAO (2016) Industrie 4.0 – Wo steht die Revolution der Arbeitsgestaltung? Ulm.
[2] acatech (Hrsg.) (2016) Kompetenzentwicklungsstudie Industrie 4.0 – Erste Ergebnisse und Schlussfolgerungen. München.
[3] VDMA (Hrsg.) (2016) Industrie 4.0 - Qualifizierung 2025. Frankfurt am Main.

Supported by:
Ministry of Innovation, Science and Research of the State of North Rhine-Westphalia

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