WORK 4.0: MEGATRENDS DIGITAL WORK OF THE FUTURE – 25 THESSES

Results of a project carried out by HR Digital & Innovation and St. Gallen University
Digitalization is having a dramatic effect on the way we work.
Machines are replacing humans.
Customers cooperate with computers.
Companies are being dissolved.
Employees refuse to accept hierarchies.
HR needs to act.

THE "WORK 4.0" STUDY HAS QUESTIONED EXPERTS WORLDWIDE ABOUT MEGATRENDS IN DIGITAL WORK
Academics at St. Gallen University and a HR Digital & Innovation team have conducted 60 expert interviews (of which 31 were detailed, structured interviews), on the basis of which 25 megatrends for Work 4.0 were derived.

- 31 structured interviews
- 10 expert interviews with top managers in the telecommunications and ICT sectors
- 9 expert interviews at MIT, the Berkman Center of Harvard University, Berkeley and Stanford universities, as well as with employees in Silicon Valley
- 5 expert interviews with corporate consultants
- 5 expert interviews with representatives of associations and trade unions
- 5 expert interviews with academics at LMU and Munich University of Applied Sciences, Berlin Humboldt University, Johann Wolfgang Goethe University in Frankfurt, Vienna University, etc.
INTRODUCTION. FROM THE 1. TO THE 4. INDUSTRIAL REVOLUTION
REVOLUTION INSTEAD OF EVOLUTION. INDUSTRY 4.0 AS A QUANTUM LEAP

1. INDUSTRIAL REVOLUTION: introduction of mechanical production systems using water and steam power
   - First mechanical weaving loom, 1784

2. INDUSTRIAL REVOLUTION: the introduction of shared mass production with the aid of electrical energy
   - The first conveyor belt, Cincinnati abattoirs, 1870
   - The first programmable logic controller (PLC) Modicon 084, 1969

3. INDUSTRIAL REVOLUTION: the use of cyber-physical systems
   - The use of robotics and IT to enhance the automation of production

4. INDUSTRIAL REVOLUTION: the use of cyber-physical systems
   - Smart Factory

Physical capacity: Machines help humans (power)
Intellectual capacity: Machines replace humans (reasoning)

Today
SUBSTITUTION INSTEAD OF SUBSIDIES. WORK 4.0

1. INDUSTRIAL REVOLUTION: Mechanization of work

2. INDUSTRIAL REVOLUTION: Taylorism

3. INDUSTRIAL REVOLUTION: Skilled work

4. INDUSTRIAL REVOLUTION: ???

- Physical capacity: Machines help humans (power)
- Intellectual capacity: Machines replace humans (reasoning)

1800 - 1900 - 2000 - Heute

- Heute
Drivers of change: Machines are learning to think

1. Self-reliant interaction with the physical world
   - Development of fine and gross motor skills of robots
   - Identification of environment and assured spatial navigation

   ... Kiva industrial robot
   ... Atlas, Baxter industrial robots

2. Development of ability to comprehend and use speech
   - Voice recognition
   - Processing of natural language
   - Active use of language (both written and spoken)

   ... voice recognition (e.g. Siri, Microsoft Cortana)
   ... Robot journalism (e.g. Narrative Science, Automated Insights)

3. Ability to solve problems
   - Answering unstructured questions
   - Rule-based analysis
   - Pattern recognition and classification

   ... self-steering car (Google Car)
   ... Artificial intelligence IBM Watson (pictured playing 'Jeopardy')
DRIVERS OF CHANGE 2. INTELLIGENT MACHINES BECOME OMNIPRESENT

17 billion connected devices in 2014 (MIT Technology Review)

Data volume per minute in 2014 (Data never sleeps 2.0)

E-mails sent: 204,000,000
Google inquiries: 4,000,000
Information shared via Facebook: 2,460,000
Photos shared via WhatsApp: 347,222
Tweets via Twitter: 277,000
App downloads: 48,000

Industrial robots sold in 2013 (International Federation of Robotics)

<table>
<thead>
<tr>
<th>Country</th>
<th>Sales</th>
</tr>
</thead>
<tbody>
<tr>
<td>China</td>
<td>37,000</td>
</tr>
<tr>
<td>Japan</td>
<td>26,000</td>
</tr>
<tr>
<td>North America</td>
<td>24,000</td>
</tr>
<tr>
<td>Korea</td>
<td>21,000</td>
</tr>
<tr>
<td>Germany</td>
<td>18,000</td>
</tr>
</tbody>
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Worldwide sale of industrial robots by sector in 2013 (International Federation of Robotics)

- Pharmaceutical and cosmetica
- Food
- Plastics
- Metal
- Electronics
- Cars

... also 2.4 verbundene Geräte pro Person
25 THESES.  THE DISINTEGRATION OF THE ORGANIZATION
1. FLUID INSTEAD OF RIGID
The modern work environment is characterized by networks. Standardized back-end processes are shared between companies without this being visible to the customers or employees. This creates jobs without a clear organizational allocation and products without a clear origin.
2. PEER-TO-PEER INSTEAD OF HIERARCHY

Highly specialized professionals communicate worldwide in special interest communities. Loyalty is no longer based on organizational affiliation, but is only driven by professional expertise. Once these ties have been cut, this kind of organization becomes impossible. Trade unions are already becoming aware of this: dedication to common interests is a selective process today.
3. ASSIGNING INSTEAD OF EMPLOYING
To provide specific services, companies rely less on a workforce permanently attached to the company. The global transparency of skills and the availability of highly qualified staff results in "hiring on demand". The employment relationship becomes a work assignment.
4. SAP INSTEAD OF MCKINSEY

Organizations are increasingly structured on the basis of organigrams. Complex IT systems specify standardized processes and organizational forms. It is cheaper to adapt the organization to the software than to individualize the software. Software standardization makes organizational forms more homogeneous.
5. OPEN INSTEAD OF CLOSED
Accelerated demand for transparency and the necessity of co-creation with customers (open innovation) leads to the opening up of previously closed corporate structures. Transitions between inside and outside become fluid, proprietary knowledge, such as patents, lose their value. The ability to scale rapidly and transparently becomes the best way forward. Thus the crowd becomes a part of the value-added chain.
6. PROSUMERS INSTEAD OF PROFESSIONAL PRODUCERS
Companies increasingly rely on customers instead of employees. Many (digitalizable) services are provided without charge by enthusiastic volunteers. Prosumerism blurs the boundaries between producers and consumers. Voluntary digital work replaces professional employment.
25 THESES. WORK IN THE DIGITAL NETWORK ECONOMY
7. FROM EXECUTION TO MONITORING
The role of humans in the production process is changing; they are becoming machine supervisors rather than active providers of labor. Routine processes and physically strenuous activities are now automatically carried out by machines. Humans only monitor and intervene in emergencies.
8. MACHINES AS COLLEAGUES, COOPERATION PARTNERS AND MONITORS
New forms of interaction between man and machine are coming to the fore. Many variants will co-exist in the future. From people who control machines to machines as colleagues to a merger between man and machine or even a complete take-over by machines.
9. CLOUD- AND CROWS-WORKING AS A TRANSITIONAL PHENOMENON
Digital services are divided into ever smaller parts and delegated to "virtual laborers". Big data analyses allow value contributions to be accurately allocated to the various workers. Cloud/click workers provide their services as piecework. Many of these activities are expected to become fully digitalized in the near future.
10. THE DATA READERS

Big data has resulted in sufficient data being available for all areas of life. The ability to combine and interpret these in a meaningful way is one of the key capabilities of digital work and cannot be supplanted. However, working with big data differs from traditional data analysis in that hypotheses are no longer required ("end of theory").
11. WORK WITHOUT LIMITS
Highly qualified specialists work on projects, providing services around the world. Qualifications are globally transparent and comparable. The geographical location of the service provider no longer plays a role. For the first time, work is now as mobile as capital.
12. BLURRING LINES BETWEEN WORK AND PRIVATE LIFE
Traditional workplaces and working hours are becoming a thing of the past. For workers, this results in the potential to individually organize their work, for example to better combine work and family, but also creates new stress factors ("always on").
13. NON-LINEAR THINKING AS A HUMAN DOMAIN
The automation of work is finite as there are certain creative activities that, as far as is foreseeable at present, cannot be undertaken by machines. These are mainly specific niche activities. Entrepreneurial skills, creativity and the control of machines are regarded as skills that are difficult to replace.
14. REINFORCING PERSONAL SERVICES
In high wage countries, activities involving direct human interactions are more highly valued. The proportion of these jobs is growing. Standardizable and anonymous processes, on the other hand, especially in the ICT field, become subject to offshoring and further efficiency pressure.
15. SELF-MANAGEMENT AS A CORE QUALIFICATION
The flexible and demand-oriented allocation of orders to labor brokers results in the dissolution of traditional employment relationships and processes. Work time is made up of micro-slices of work times spent on various tasks, which the employee combines according to necessity and ability.
It is becoming increasingly common for the providers of creative or intellectual services to be expected to implement them in concrete form. 3D printers and other tools favor this trend.
17. WE CHILD PRODIGIES

The ever-increasing importance of IT allows the "nerds" to find their way into the upper echelons of the corporate world. The musical child prodigies of former times have become the precocious app developers and data experts of today. This generation will make a substantial contribution towards disruptive change within corporate cultures. It is not formal qualifications but only technical skills that will determine employability in future.
18. DIGITAL INCLUSION
Remote working, the anonymity of crowd- and click-working employment conditions and the flexibilization of working hours will also bring social groups not available for traditional employment relationships onto the labor market. As has been observed in Berlin, for example, this applies to both start-ups and to click-workers in emerging economies.
25 THESES. CHALLENGES FOR BOTH – THE ORGANIZATION AND ITS LEADERS
19. THE CHALLENGE OF „LATTE MACCHIATO“ WORKPLACE
The workplace of people in flexible employment relationships is extending into the public space. Physical offices are temporary anchor points for human interaction, which are mainly used for networking. Work takes place everywhere - except at a worker's own desk.
20. BREAD AND CIRCUSES
It is when carrying out standardized activities that workers yearn for distractions and rewards. Gamification and the intuitive operation of IT interfaces are becoming increasingly important, turning the work environment into a virtual playing field. Employers are required to integrate gaming design principles into standardized IT applications.
21. JOB HOPPING AND CHERRY-PICKING AS HR CHALLENGES
The ties between the employer and employee are loosening. Flexible forms of work and cooperation lead to employees always having one foot in the labor market. This makes systematic staff development more difficult. At the same time, expectations and demands with regard to directly usable qualifications are increasing.
22. HANDS-OFF MANAGEMENT
The demise of geographically located workplaces is associated with a change from a presence to a results culture. Managers must learn that they will need to motivate rather than control workers. The skill is to establish personal ties even through impersonal technical channels and to maintain them.
23. EXPLORE VS. EXPLOIT
The increasing pace of innovation requires the constant replacement of innovative business areas and the transformation of the existing business models (explore). At the same time, the core business that is still profitable must be pursued as efficiently as possible (exploit). Management thus becomes "two-handed" and operates both in the present and in the future.
24. MATCHING BY MOUSE-CLICK
Digital workers are quantified in the form of individual data packages – their skills, experience and capacities. This facilitates the allocation of matching tasks. However, disruptive factors in the data profile can also prevent such matching. Staff selection becomes less intuitive, but also less dependent on cultural matches.
25. GOOD DATA, BAD DATA
Sensors characterize the digital "workplace". Environmental characteristics, processes, work results and the workers are all recorded on an ongoing basis to provide both the employer and the employee with information about the quality of work and potential improvements. Practical benefits must be weighed up against ethical considerations.
CONCLUSION FOR HR OF THE FUTURE
CONCLUSIONS FOR HUMAN RESOURCES MANAGEMENT 1: TODAY'S REQUIREMENTS

INNOVATION CULTURE
It is necessary to meet the demand for participation, professionalize knowledge management, use open innovation and encourage intrapreneurship.

FUTURE WORK
Autonomy of place, working hours and time off, a results-based culture, not a presence culture.

MANAGEMENT
Reinforcement of networking and dialog skills, change from control to encouragement.

LABOR POLICY
Autonomy of time and place must be combined with "autonomy of content". Face-to-face encounters and breaks from the digital must be made possible.

ORGANIZATION
Flat network structures, integration of social media. The creation of platforms and communities within and outside the organization.

SKILLS
Focus on creativity, non-linear thinking and entrepreneurship, combined with clear-cut ICT skills.
CONCLUSIONS FOR HUMAN RESOURCES MANAGEMENT 2: FUTURE DESIGNS

- Supervisors as "feel-good managers"
- The outsourcing of all routine work
- Creation of digital breaks
- Development of an algorithm to promote employee loyalty
- Big data as a management tool
- Teaching employees to become part-time recruiters and entrepreneurs
- Child prodigies and nerds as top decision-makers
- Learning to cope with VUCA worlds (volatility, uncertainty, complexity, ambiguity)
- Construction of the organization around the people with the greatest potential
- Workplaces that are designed to promote discovery (learning), cooperation and fun
- A focus on design
- A focus on value failure
- Maximization of information dissemination speed and volume
- Development of strategies for risk management when handling personal data
- External rather than internal?
- Assigning instead of employing
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THANK YOU