1. CHALLENGES AND THREE DRIVERS FOR THE FUTURE OF WORK

2. ZOOMING IN:
   GIGIFICATION OF KNOWLEDGE WORK
   MAN–MACHINE COLLABORATION:
   CONSTRUCTION OF KNOWLEDGE & DESIGN OF BEHAVIOURS
## Challenges of managing knowledge work in digital contexts

<table>
<thead>
<tr>
<th>Real-time interactions</th>
<th>Rapid &amp; ubiquitous availability of current and action-relevant knowledge</th>
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</thead>
<tbody>
<tr>
<td>Big data &amp; large amounts of information</td>
<td>How to integrate, interpret and make sense?</td>
</tr>
</tbody>
</table>
| New division of work between man and machine | • How do people and machines learn together?  
• Which skills are needed for work 4.0? |
| Algorithms “know” & decide | • Do we understand how machines decide?  
• How are machine decisions explained?  
• How to ensure that decisions are made within social and legal norms? |
| Collaboration along value chains | Intensified exchange of knowledge across organizational boundaries  
How do the partners learn together? |
Knowledge work 4.0 is a human activity based on cognitive skills and supported by applications of artificial intelligence that has an intangible output and whose value added relies on information processing and creativity, and consequently on the creation and communication of knowledge.

Knowledge workers are people who primarily engage in knowledge work.

Source: adapted from North/ Güldenberg (2011): Effective Knowledge work
Drivers of the future of work

What knowledge workers want

What socio-economic developments condition

What digital technologies & AI can do

- Distributed value generation (Networks, platforms, collaboration)
- Work without borders
- New forms of interaction between man and machine
- From knowledge worker to learning worker

Klaus North 2020
### What workers want

#### Fundamental motives

- Performance capability
- Success
- Prosperity/wealth
- Contentment/satisfaction
- Success
- Family
- Idealsim
- Sustainability
- Meaningfulness
- Flexibility
- Appreciation
- Friendship/team spirit
- Optimism

#### Prevalent values

- (Self-)discipline/prowess
- Determination
- Obedience/probity
- Sense of order
- Conscientiousness/reliability
- Fidelity/Loyalty
- (Material/job) security/safety
- Freedom/independence
- Individualism
- Responsibility
- Idealism
- Sustainability
- Meaningfulness
- Flexibility
- Appreciation
- Friendship/team spirit
- Optimism

<table>
<thead>
<tr>
<th>Baby Boomers</th>
<th>Generation X</th>
<th>Generation Y</th>
<th>Generation Z</th>
</tr>
</thead>
<tbody>
<tr>
<td>• High commitment (“workaholism”)</td>
<td>• Good work-life balance</td>
<td>• Abundant time and space for private life</td>
<td>• High material standard and security</td>
</tr>
<tr>
<td>• Distinct hierarchies</td>
<td>• Separation of professional and private life</td>
<td>• Work-life blending</td>
<td>• Strict separation of work and private life</td>
</tr>
<tr>
<td>• Structured working style</td>
<td>• High level of autonomy/low guidance</td>
<td>• Meaningful activities</td>
<td>• Extensive recreational time</td>
</tr>
<tr>
<td></td>
<td>• Flat hierarchies</td>
<td>• Flat/flexible hierarchies</td>
<td>• No or low (long-term) commitment to employer</td>
</tr>
<tr>
<td></td>
<td>• Informal working environment</td>
<td>• Good pay and benefits</td>
<td>• Collegial work climate</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Specialist careers more important than management positions</td>
<td></td>
</tr>
</tbody>
</table>

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*With a more diverse workforce, people’s aspirations and expectations at the workplace vary.*

Built on the power of purpose: the five key pillars of the new work movement:

1. Empower employees to do tasks they really want to do.
2. Work should be inspiring.
3. Technology should work for people. The key is to use technology for human gain, not let it use us.
4. Prioritize community: A sense of working for a community and goal gives people a purpose and helps them build a better world while they’re at it.
5. Make work about freedom: Freedom to choose your tasks, your projects, your location, your hours, and what you want to learn.

The Four Worlds of Work in 2030

**The Yellow World**
Humans come first

Social-first and community businesses prosper. Crowdfunded capital flows towards ethical and blameless brands. There is a search for meaning and relevance with a social heart. Artisans, makers and ‘new Worker Guilds’ thrive. Humanness is highly valued.

**The Red World**
Innovation rules

Organisations and individuals race to give consumers what they want. Innovation outpaces regulation. Digital platforms give outsized reach and influence to those with a winning idea. Specialists and niche profit-makers flourish.

**The Green World**
Companies care

Social responsibility and trust dominate the corporate agenda with concerns about demographic changes, climate and sustainability becoming key drivers of business.

**The Blue World**
Corporate is king

Big company capitalism rules as organisations continue to grow bigger and individual preferences trump beliefs about social responsibility.

What digital technologies & AI can do

https://www2.deloitte.com/se/sv/pages/technology/articles/part1-artificial-intelligence-defined.html
Tasks not jobs will be automated

Figure 1. Changing prevalence of types of tasks required for work over time

What digital technologies & AI can do

Jobs of the future: some occupations will grow, others will decline, and new ones we cannot envision will be created.

**Workforce transitions**

Our scenarios for automation and labor demand highlight challenges for workers.

**Switching occupations...**

75M–375M

Number of people who may need to switch occupational categories by 2030, under our midpoint to rapid automation adoption scenarios.

**Demanding new skills...**

Applying expertise
Interacting with stakeholders
Managing people
Unpredictable physical
Processing data
Collecting data
Predictable physical

**Changing educational requirements**

Advanced
Emerging

Secondary or less
Associate
College and advanced

Drivers of the future of work

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What digital technologies & AI can do

Klaus North 2020
Instead of structuring people’s jobs around broadly defined roles, work now becomes a series of deliverables and projects—for instance, launching a new drug, accessing a new business or transforming IT infrastructure to scale with long-term needs. Then, drawing from both internal resources and high-end independent professionals, companies can assemble the best team for the job,”


## Gigification of knowledge Work

<table>
<thead>
<tr>
<th>Accelerated adoption of task gigification</th>
<th>Slower adoption and growth of task gigification</th>
<th>Less amenable to task gigification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tasks will need reengineering of organizational processes to facilitate transition to remote working</td>
<td>Can tasks be done remotely (as evident during pandemic)?</td>
<td>Can there be delay between value creation and consumption?</td>
</tr>
<tr>
<td>NO</td>
<td>NO</td>
<td>YES</td>
</tr>
</tbody>
</table>

Source: Sameer Hasija et al.
Platform-enabled gig economy

Labor market(s) comprising workers “hired under ‘flexible’ arrangements, as ‘independent contractors’ or ‘consultants,’ working only to complete a particular task or for a defined time” & mediated by platforms

Digitized location independent work
Online market(s) for contingent (task- or project-based) intangible paid work that is processed online and organized via digital platforms intermediating between clients and workers

Microtasking/
“click work”
Tiny piecemeal units of a (subdivided) task

Macrotasking
More substantial tasks

Local micro-
tasking
Tiny piecemeal units of a (subdivided) task that needs to be carried out location-based

Consumer-led services/
manual work
Specific (low-priced) local services

Independent knowledge work
Comprehensive tasks requiring specific expertise and close cooperation between client and consultant

Exemplary
tasks
• Data entry
• Completion of surveys
• Finding of information
• Software/web development
• Translation
• Data analytics
• Design
• On-site verification of marketing measures
• Delivery work
• Cab driving
• Electrical installation
• Cleaning
• Management consulting
• Legal counseling

Exemplary platforms
• Amazon Mechanical Turk
• CrowdFlower
• 99designs
• Upwork
• appJobber
• Streetspotr
• Uber
• Deliveroo
• TaskRabbit
• Business Talent Group
• COMATCH

Location-bound or interaction-intense work
Labor market(s) for work that is typically carried out locally and usually intermediated by a matchmaking platform
To gig or not to gig - security versus flexibility

Sources: https://www.gigeconomydata.org/basics/how-many-gig-workers-are-there
http://resources.library.leeds.ac.uk/final-chapter/dissertations/lubs/3345example1.pdf, p. 20
Zooming in on the future of work: New forms of interaction between man and machine

- What knowledge workers want
- What socio-economic developments condition
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Augmentation

Augmented intelligence, also referred to as intelligence augmentation (IA) and cognitive augmentation, is a complement to human intelligence. It’s about helping humans become faster and smarter at the tasks they’re performing.

Five Approaches to Augmentation

Augmentation blends the power of AI with the sophistication of human perception, empathy, and experience. In augmentation situations, the knowledge worker can either lead or support the automated decision tool. In robotic surgery, for example, the human surgeon has thus far played the lead role in surgical decisions and actions. In the future, however, enhanced diagnostic capabilities from technologies such as deep learning may mean that, for routine radiology and pathology tasks, machines may play the lead role.

We suggest there are 5 alternative roles for human clinicians in which different forms of augmentation take place:

- **Process Design Role:** Clinicians or managers can play a process design role in which they focus on how AI supports the process in question.
- **Human Capability Role:** Clinicians can adopt a human capability role in which they primarily employ uniquely human skills such as empathy and interpersonal intelligences.
- **Colleague Role:** Human clinicians may play the role of colleague alongside smart machines by evaluating the machines’ immediate outputs, determining if the data seem reasonable, and using this information to augment or inform their own judgments.
- **Niche Role:** Clinicians can fill a niche role for which no technology has yet been developed and likely will not be developed because it would not be feasible or economical to do so.
- **Development Role:** Clinicians can also play a development role with respect to AI technologies that other clinicians will use. In this role, they may work as researchers or in collaboration with AI vendors.

Artificial Intelligence and the Augmentation of Health Care Decision-Making
https://catalyst.nejm.org/ai-technologies-augmentation-healthcare-decisions/

„We had better be quite sure that the purpose put into the machine is the purpose which we really desire“

“We wish a slave to be intelligent, to be able to assist us in the carrying out of our tasks. However, we also wish him to be subservient. Complete subservience and complete intelligence do not go together.”
Training of Chatbots

“Microsoft’s AI assistant, Cortana, required extensive training to develop just the right personality: confident, caring, and helpful but not bossy. Instilling those qualities took countless hours of attention by a team that included a poet, a novelist, and a playwright.

Source: Wilson and Daugherty 2018a, p.5
## Comparing Symbolic AI & Non-symbolic AI

<table>
<thead>
<tr>
<th>Artificial Intelligence (AI)</th>
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<tbody>
<tr>
<td>Symbolic AI</td>
<td>Non-symbolic AI</td>
</tr>
<tr>
<td>Knowledge Engineering</td>
<td>Data Science</td>
</tr>
<tr>
<td>Expert System</td>
<td>Machine Learning</td>
</tr>
<tr>
<td>Cognitive Playbooks &amp; Ontologies</td>
<td>Algorithms &amp; Models</td>
</tr>
<tr>
<td>Deductive Inference &amp; Contextual Reasoning</td>
<td>Inductive Inference &amp; Probabilistic Reasoning</td>
</tr>
<tr>
<td>Validation of Hypotheses &amp; Explanation</td>
<td>Predictions &amp; Tentative Hypotheses</td>
</tr>
<tr>
<td>Transparent &amp; Explainable</td>
<td>Black Box</td>
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</table>
Companies see the biggest performance gains when humans and smart machines collaborate.

**People are needed to:**
- train machines,
- explain their outputs,
- and ensure their responsible use.

**AI, in turn, can enhance**
- humans’ cognitive skills and creativity,
- free workers from low-level tasks,
- and extend their physical capabilities.
US Congress slams Boeing in searing 737 MAX report

A congressional committee has found that the firm "gambled with the public's safety," leading to 346 deaths. They also criticized federal regulators for allowing the aircraft to fly.

Boeing's 'culture of concealment' led to fatal 737 Max crashes, report finds

Preliminary findings conclude Boeing 'jeopardized the safety of the flying public' in its attempts to get Max approved by regulators.

The preliminary report form the US House Transportation Committee on Boeing's grounded 737 MAX aircraft was released on Friday, accusing the aviation giant and regulators of allowing a "fundamentally flawed" plane into the skies.
How the MCAS (Maneuvering Characteristics Augmentation System) works on the 737 MAX

1. The angle-of-attack sensor aligns itself with oncoming airflow.
   - The angle of attack is the angle between the wing and the airflow.

2. Data from the sensor is sent to the flight computer.
   - If the angle rises too high, suggesting an approaching stall ...

3. MCAS automatically swivels the horizontal tail to lift the plane’s tail while moving the nose down.
   - ... the MCAS activates.

Sources: Boeing, FAA, Indonesia National Transportation Safety Committee, Leeham.net, and The Air Current

Reporting by DOMINIC GATES,
Graphic by MARK NOWLIN / THE SEATTLE TIMES
Reasons for failure

Extensive interviews with people involved with the program, and a review of proprietary documents show:

1. Boeing originally designed MCAS as a simple solution with a narrow scope.
2. As Boeing and the FAA advanced the 737 MAX toward production, they limited the scrutiny and testing of the MCAS design.
3. Then they agreed not to inform pilots about MCAS in manuals, even though Boeing’s safety analysis expected pilots to be the primary backstop in the event the system went haywire.


4. Boeing promised to Southwest Airlines to reimburse 1 Million US $ per 737 Max bought if FAA required simulator training of pilots for the new plane.
5. In Boeings restructuring experienced engineers left the firm and vital knowledge and experience was not transferred to younger engineers.

The story of the Max is ultimately the story of the Darwinian business cycle where mature companies like Boeing face constant threats from new products, new competitors, and the search for new growth. (The Verge)
Microsoft’s 18 design guidelines for human-AI interaction.
