



In our previous article, we illustrated the effects of *Industry 4.0* on organizations, esp. hierarchies, future decision-making-processes, required individual skills and the need to sign up for life-long learning.

Here's a new thought we can start to get accustomed to right away: working in hybrid teams with our new colleagues, the robots. Read more about the drivers and effects of the so-called *human-robot-collaboration* and the tamagotchi effect (yes, it's back!).

Recent developments in robotics

We all know of course, but just for clarification: the word "robot" is derived from the Czech "robota" which translates into "enforced labor" and goes back to a play of Czech author Karel Capek in 1920 in which creatures half-human, half-machine have a key role: the robots.

Apart from being able to move (which differentiates robots from machines), robots have been able to "hear" and "see" for some decades. Recent developments now allow for a three-dimensional vision which enables them to move independently in a room without bouncing into the next wall. Their sensor systems and tactile senses have been massively improved over the last years so that their fine-motor skills enable picking up and holding

pencils or raw eggs and distinguishing different materials. They interact and communicate with other machines and robots. In combination with self-learning algorithms, staggering technological opportunities are possible: driverless cars and drones are just the beginning.

Scientists are teaching robots manners and social skills, like how to give a human the right personal space and when to interact and when to withdraw. This can be achieved via facial recognition software and systems to interpret facial expressions.

In short: robots become more powerful and damned smart.....

Effects to the job market

Numerous studies have investigated the effect of speeding technology development on the job market. They all have one result in common: in the medium- and long term, more than half of the jobs are in danger. Horst Neumann, Volkswagen's board member responsible for HR, predicts a loss of 50.000 jobs over the next 20 years within the Volkswagen group alone.

The studies also share the conclusion that „the lower the qualification, the higher the risk of being replaced by a robot“, which seems evident. BUT: due to the improved sensor systems and algorithmic capabilities, robots will also “threaten” jobs on middle qualification level, in the office (clerks and assistants) and other typical admin, non-routine tasks. Robots can work on large text documents much faster, can read them, process them and even draw conclusions at a pace, precision and capacity which a human will never be able to beat. Research from ING DIBA foresees a decrease of more than 85% of the jobs in the admin area.

Although sales of industry robots in 2013 topped the mark of 135 million robots globally (with China and Japan leading, Germany ranked fifth), there are some years to come before we'll see robots everywhere. They are getting cheaper but are still too expensive for a comprehensive, industry-wide coverage.

But researchers and scientists are clear: it will be less than a generation before we see the real revolution. Industry 4.0 and advanced robotics will be much more revolutionary than the first three industrial ages, in which technology (machines) supported humans to work more efficient – now it will completely replace them That's one big difference.

What our working world will look like in future can be witnessed at the Fraunhofer Institute in Magdeburg, Germany, where scientists are testing joint collaboration of humans and robots. Robots, e.g. from ABB or KUKA, form part of what is called *Human-Robot-Collaboration* and which will, according to Michael Schenk, Director of the Institute, revolutionize our working world. This is no less than a paradigm shift from traditional robotics, which leads to another big difference: robots are no longer in “cages”, separated

from the workforce by fences or walls, but collaborate with humans “hand in gripper”, forming a “hybrid team”. Being that close, other technological research and testing deal with the question of safety at work – how to train a robot in a way that a contact with a human results in a gentle stroke only and not in a knock-out punch? And who supervises the kind of work that is shared? Lots of topics to clarify for a hybrid team!

From working in hybrid teams to bonding with bots

You found raising a plastic pet named *Tamagotchi* somewhat weird already 20 years ago? Possibly, but the triggers and behavioral patterns that drove that hype are even more valid today and are known as the “Tamagotchi effect” which defines – in short – the development of emotional attachment with machines or robots. Is it possible to truly fall in love with a robot? Not really and serious research supports that. But all recently published studies highlight the emotional connection that humans form with robots and which go beyond, for example, giving your car a name.....

Some might remember the sweet stories about the tramping robot hitchBOT last year through Canada and the USA and the “mourning” its destruction caused among its fans. What looked like a fun experiment was a serious scientific program across several disciplines to initiate a discussion on human-robot-interaction and the question whether robots can trust humans (not the other way round!) and unfortunately, hitchBOT’s trust in the last human picking it up was a mistake.

Adding to that are the results of a UW doctorate in education by Julie Carpenter. She interviewed Explosive Ordnance Disposal military personnel from the US forces who use robots to disarm explosives and part of her work was to understand whether the relationship between soldiers and robots could affect their decision-making abilities. The impact of her findings is staggering and gives a deep insight into human behavioral science.

The personnel interviewed assigned robots human or animal-like attributes, including gender, and displayed a kind of empathy towards the machines. They named their robots, expressed sadness when the robot was hit or destroyed in a combat situation and sometimes even went so far as to bury them and decorating them “posthumously” with medals of honor.

What might provoke a smile while reading that, the explanation for that behavior is simple: the more a bot shows elements of “personality” and has its little quirks, the more human it seems. For the soldiers, the robots were first a critical tool to maintain, to rely on and to use daily. But with robots saving their lives again and again and the psychologically searing experience of being in a combat situation added to the attachment.

Scientifically speaking, this attachment to robots stems in part from the human brain's mirror-neuron system, which fires up whenever watching the movement of someone or something, Peter Singer points out. Singer is a leading defense analyst at the Brookings Institution and author of "Wired for War: the Robotics Revolution and Conflict in the 21st century". The mirror-neuron system helps form the foundation for empathy and understanding the mindset of another being, but it can also lead people to project personalities and emotions onto objects. A popular example is the little robot R2D2 from the Star Wars-movies which has a large supporter's club. Everyone in the film treats "him" like a person, even commanding him for "bravery".

The downside of this bonding process, as Julie Carpenter found out in her research, was an emotional connection so strong, that some soldiers even retrieved "their" robot from dangerous situations, risking their own lives for their little companion. One of Carpenter's conclusion is that if you feel emotionally attached to something it will affect your decision-making.

Given these behavioral patterns, it will be difficult for us not to see robots like humans and not getting attached to them, also because of the usual design that resembles a human body and often has a human-like face. Some scientists therefore already advocate a less human design to reduce the trigger points.

On the other hand, nothing seems to stop the robots from taking over A recent study by the MIT demonstrates that robot-bosses seem to show more understanding for employees than human bosses do. The experiment was set up in a way that a group of employees was split in two teams, one led by a robot, the other led by a human. The two "bosses" then performed some leadership tasks like e.g. assigning tasks, taking decisions, In interviews following the test, many participants in their feedback pointed out that they felt much better understood by the robot-boss than by the human-boss.

This is all frightening and fascinating at once.... But back to business and what all this means for a company:

Topics and questions to be answered by corporates

Industry 4.0 in all its facets provokes a variety of questions to be answered, let's focus on some that come up with *human-robot-collaboration*:

- Permanent "upskilling" – the robots will do that themselves but how can we change mindsets in a way that lifelong learning will be a must as routine jobs of today will be executed by robots tomorrow? What do we need to change in our educational systems?

- Change Management – how do we (both in companies, but also as a society) react to potential fears of losing jobs and loss of social status due to advanced technology? And what are potential actions to prevent a “revolution against the revolution”?
- Labor psychology – under which circumstances will humans accept collaborating robots? Will they become good team players in a hybrid team?
- Safety at work – Which safety measures have to be foreseen for hybrid team work between robots and humans and when working in the same space, like e.g. a warehouse?
- Jobs and job profiles – jobs will undergo a constant change or will become obsolete and replaced by new jobs which we even can't imagine today. This constant need for adaption will have a massive impact on job grading and related remuneration systems, career development and the like. How much of the established structures and systems will we need to throw overboard?
- Performance assessment – what's the robot's share in it and do we like the idea of even more sophisticated measures on efficiency, quality and performance?

We can well imagine some leaders who think this is all well placed on the desk of their HR department, which would be quite short-sighted Of course, HR plays a key role in getting any solutions to the topics above into daily operations, but overall, we need a company-wide and even social discussion how to deal with these technological developments. As said, we don't have a precise timeline when and how the effects will occur – but as always, doing nothing is not an option and we won't get the genie (or: the robot) back into the bottle.

In a nutshell

Human to machine relationships will one day be equivalent to relationships between living things – there is no “if”, just a “when”.

There is no evading a development that comes with a much higher speed than any other „industrial revolution“ before. Technology (a robot) does no longer support humans at their workplace but replaces them completely, being more and more advanced to take over human work and even improve by self-learning. This might be frightening but can also be an answer to our ageing workforce (demography!), skills shortage and the increasing employees' demand for advanced and purposeful jobs.

Would you like to get in touch? I would highly appreciate your feedback to frauke@christiansen.company

Photo: shutterstock