**Thoughts on the Digital Revolution for Society and Education**

The digital revolution is in full swing. How will it change our world? The amount of data we produce doubles every year. In other words: in 2016 we produced as much data as in the entire history of humankind through 2015. Every minute we produce hundreds of thousands of Google searches and Facebook posts. These contain information that reveals how we think and feel. Soon, the things around us, possibly even our clothing, also will be connected with the Internet. It is estimated that in 10 years’ time there will be 150 billion networked measuring sensors, 20 times more than people on Earth. Then, the amount of data will double every 12 hours. Many companies are already trying to turn this Big Data into Big Money.

Everything will become intelligent; soon we will not only have smart phones, but also smart homes, smart factories and smart cities. …

The field of artificial intelligence is, indeed, making breathtaking advances. In particular, it is contributing to the automation of data analysis. Artificial intelligence is no longer programmed line by line, but is now capable of learning, thereby continuously developing itself. Recently, Google's DeepMind algorithm taught itself how to win 49 Atari games. Algorithms can now recognize handwritten language and patterns almost as well as humans and even complete some tasks better than them. They are able to describe the contents of photos and videos. Today 70% of all financial transactions are performed by algorithms. News content is, in part, automatically generated. This all has radical economic consequences: in the coming 10 to 20 years around half of today's jobs will be threatened by algorithms. 40% of today's top 500 companies will have vanished in a decade.

It can be expected that supercomputers will soon surpass human capabilities in almost all areas—somewhere between 2020 and 2060. Experts are starting to ring alarm bells. Technology visionaries, such as Elon Musk from Tesla Motors, Bill Gates from Microsoft and Apple co-founder Steve Wozniak, are warning that super-intelligence is a serious danger for humanity, possibly even more dangerous than nuclear weapons. Is this alarmism?

One thing is clear: **the way in which we organize the economy and society will change fundamentally.** We are experiencing the largest transformation since the end of the Second World War; after the automation of production and the creation of self-driving cars the automation of society is next. With this, society is at a crossroads, which promises great opportunities, but also considerable risks. If we take the wrong decisions it could threaten our greatest historical achievements….

Everything started quite harmlessly. Search engines and recommendation platforms began to offer us personalized suggestions for products and services. This information is based on personal and meta-data that has been gathered from previous searches, purchases and mobility behavior, as well as social interactions. While officially, the identity of the user is protected, it can, in practice, be inferred quite easily. Today, algorithms know pretty well what we do, what we think and how we feel—possibly even better than our friends and family or even ourselves. Often the recommendations we are offered fit so well that the resulting decisions feel as if they were our own, even though they are actually not our decisions. In fact, we are being remotely controlled ever more successfully in this manner. The more is known about us, the less likely our choices are to be free and not predetermined by others.

But it won't stop there. Some software platforms are moving towards “persuasive computing.” In the future, using sophisticated manipulation technologies, these platforms will be able to steer us through entire courses of action, be it for the execution of complex work processes or to generate free content for Internet platforms, from which corporations earn billions. *The trend goes from programming computers to programming people.*

These technologies are also becoming increasingly popular in the world of politics. Under the label of **“nudging,”** and on massive scale, governments are trying to steer citizens towards healthier or more environmentally friendly behavior by means of a "nudge"—a modern form of paternalism. The new, caring government is not only interested in what we do, but also wants to make sure that we do the things that it considers to be right. The magic phrase is "big nudging", which is the combination of big data with nudging. To many, this appears to be a sort of digital scepter that allows one to govern the masses efficiently, without having to involve citizens in democratic processes. Could this overcome vested interests and optimize the course of the world? If so, then citizens could be governed by a data-empowered “wise king”, who would be able to produce desired economic and social outcomes almost as if with a digital magic wand.

Which public systems do we therefore need to ensure that the digital society becomes a success? First, completely new educational concepts are needed. This should be more focused on critical thinking, creativity, inventiveness and entrepreneurship than on creating standardized workers (whose tasks, in the future, will be done by robots and computer algorithms). **Education should also provide an understanding of the responsible and critical use of digital technologies, because citizens must be aware of how the digital world is intertwined with the physical one.** In order to effectively and responsibly exercise their rights, citizens must have an understanding of these technologies, but also of what uses are illegitimate. This is why there is all the more need for science, industry, politics, and educational institutions to make this knowledge widely available.

**https://www.scientificamerican.com/article/will-democracy-survive-big-data-and-artificial-intelligence/**