

Beuth Hochschule für Technik, Berlin

Beuth Sprachenpreis 2016

An essay on the topic “Our digital Future”.

How to create a Future for Everyone

Applying Open Source Principles in a Digital Future



open source

by Martin Neumann

Beuth Hochschule für Technik, Berlin

Table of Contents

Abstract.....	3
Introduction.....	3
Our Digital Future – Digitization.....	4
Working in a Digital Future.....	5
Autonomous Cars.....	6
Democratizing Technology by Providing Accessibility.....	8
The Open Source Movement – a viable option for the future?.....	8
Conclusion.....	10
Literature and Images.....	11

This essay was created in *LibreOffice Writer*, version No. 4.2.8.2.

Abstract

This essay aims to give a perspective on the developments that are commonly described as “the digital future” or “digitization”, its perceived and actual effects on society and individuals as well as its risks, challenges and opportunities. To achieve this, two examples of recent technologies will be analyzed in their impact on people: autonomous cars and “crowdsourcing”, a new way of distributing tasks to workers. Later, I will explore whether a technology itself can be “evil”, as well as how society could manage an ever changing world of new, digital technologies. The essay will conclude by explaining how the Open Source Movement is an example for democratizing technology in the future.

Introduction

At the 2015 Davos World Economic Forum Eric Schmidt, executive chairman at *Google* (now renamed *Alphabet Inc.*) addressed his audience with the following quote:

[In the future], the Internet will disappear... you won't even sense it, it will be part of your presence all the time.

- Eric Schmidt, executive chairman at Alphabet Inc.

This quote epitomizes both the optimism of a global technology elite as well as the fears of many members of society who will not have a say in what the digital future will look like. On one hand, there is an unbreakable faith in a system – a globally connected network, useful for many things, as well as profitable – that will make the world a better place. Tech moguls ensure every day that their ideas and products will only have positive impact on humanity. On the other hand, there is mistrust: What will a digitized future look like? Will we lose our ability to make decisions? Will our privacy be safe? What happens when a system that we depend on fails? Some even go further and ask: Will we still be human?

This duality, I believe, is deeply rooted in human nature. Human beings always had to be innovative to survive – but voices of reason, not wanting to go headfirst into the next, new adventure, were probably just as important as innovators.

New technology has often encountered resistance. Sometimes, people had health concerns, like back in the 19th century when bavarian medical professionals declared that traveling by train would

cause pneumonia.¹ Other times, progress in engineering destroyed the peasants' livelihood, like in the case of English farmers who – in protest of their poor living conditions – destroyed threshing machines that left them without jobs in what are known as the “swing riots of 1830”.²

Perhaps the most striking example for a “technology gone bad” is nuclear energy. Just mentioning the term can ruin friendships or turn civil discussions into heated arguments. The reason for that is clear: Bad experience of improper handling of this technology, along with its abuse as a weapon, has made us cautious of its power and makes us doubt its usefulness. Even more, many people want to abolish its use altogether. But can a technology – a non-living thing – be “evil” or “dangerous”?

Our Digital Future – Digitization

When experts in computer science talk about a “digital future” or “digitization” they mean a change in how technologies will shape our daily lives – and, at least in theory, make our lives better.

But what does it mean when a reality “becomes digital”? A digit is just a number. When we say that a system is “digital”, we mean that it is composed of numbers – a mathematical model. Opposed to that, our reality is analogue. Numbers are precise, discrete and finite, while nature is not. If someone measures the temperature at which water boils and calls it “one hundred degrees Celsius”, they created a digital model of a natural, analogue process. Now, if we only have, say, one hundred possible numbers to model all temperature in the universe, we will end up with a very imprecise model. But if we have big enough amount of numbers at our disposal, we can render a relatively precise model of nature, or of whatever “thing” we want to model. It will be precise enough for humans to use in our reality. For most people, it is enough to know that it is 25 °C outside, they do not need to know the tenth digit after the decimal point: The model has become accurate enough.

And that is precisely why our future will become more and more digital. Computers have become powerful enough to model large parts of our reality. We have “enough numbers” to make accurate models of roads, weather, or social interactions. These models are already so accurate that they can predict the future in a lot of cases.

The real-life impacts digitization will have are numerous. They include autonomous cars, automatic translation software, human-computer interaction, disease control through statistical models, direct worldwide communication and many more.

But we do not only digitize models of reality, we also digitize our way of life and the way we work.

1 <http://www.nuernberginfos.de/ludwigseisenbahn-nuernberg.html>

2 https://en.wikipedia.org/wiki/Swing_Riots

Shopping, working and socializing will take place more and more online. This is how we digitize our own reality. We create a model of real things, such as the workplace, and outsource it to a digital system. Even outsourcing workforce becomes digital through a system called “crowdsourcing”, which uses network-based models to delegate tasks to workers.

All these changes have the potential to make our lives easier. But to achieve this, they have to be applied in a responsible way. People often feel overwhelmed by the challenges and are afraid of the implications of our future. And in a way, they are right: It is true that our lives will change dramatically, as will be explained in the following chapters.

Working in a Digital Future

In a short-term perspective, our workplace will change from a presence-based model to a more performance-based environment. This is made possible by fast and reliable digital communication systems. Already many people work from home, because they do not need to be in the office or in the shop in order to handle incoming tasks. Work hours become less important, results matter more than attendance – work and free-time appear to be less separated than in the past.

The implications of this new development may go even further. In 2013, Prof. Phuoc Tran-Gia and Dr. Tobias Hoßfeldt of Würzburg University explored a model called “Crowdsourcing”, in which tasks get outsourced to a “large, anonymous crowd of workers”³ instead of giving them to an employee.

Crowdsourcing works via mediator platforms. These are online communities where workers can choose tasks that were advertised by companies. One important difference to outsourcing, in which a task is given to a contractor, is that crowdsourcing tasks are “small portions of work”⁴ and not entire projects. The other difference is that workers choose their tasks themselves instead of being obligated by a company to do what is needed.

In that way, lots of workers contribute to a project without being employed by the same company. It is a way of using a workforce's skills where they can be applied best – because the workforce chooses the work it feels most capable in.

In reality, most tasks that are crowdsourced today do not yet require a lot of skill or any skill at all – though crowdsourcing of full-scale, complicated projects does exist.

3 Prof. Phuoc Tran-Gia, Dr. Tobias Hoßfeldt: “Crowdsourcing and its Impact on Future Internet Usage”, Information Technology Magazine No. 4/2013, p. 139-145

4 Ibid.

There are various types of work that are outsourced to a crowd. “Crowdsolving” outsources problems to anonymous participants for them to solve. One example is the online platform “Innocentive”⁵. There, so-called “solvers” help tackle problems ranging from data analysis to research. Solvers are volunteers who help the scientific community by offering their skills to solve certain problems. These problems, including topics from specialized medicine to waste water management, offer monetary compensation of up to 25.000 dollars.

“Crowdsensing” describes “mobile or partitionary sensing”, for example the project NoiseTube⁶, which aims to map noise pollution by measuring noise levels through participants' smartphones.

Other areas of crowdsourcing include “crowdwisdom” (i.e. Wikipedia), “crowdtesting” or “crowdvoting” for gathering opinions.

This model of distributing work, in which tasks are given to a multitude of individuals, is not yet used as widely as it could be. In the future, it is imaginable that most work will follow such models. Workers will still have to learn a certain field, but maybe they will not have a single employer but will rather be able to choose projects that they want to invest their time and skills in. Translators and programmers already follow this routine in a lot of cases – surely, other areas will follow.

If crowdsourcing was to become more widely applied in the structure of our work environments, the availability of work will make the job market more competitive; a person from Australia will have the opportunity to apply for a task offered by a South African company. More applicants will be able to look for work, while also more companies will try to find the right specialists.

A completely free job market might create inequality. Possibly, a small, highly skilled work force will take all the lucrative tasks for themselves and leave the others nothing, a meritocracy with winners as well as losers. But as challenges also keep growing and multiplying, it is easy to imagine that there will be plenty of work for everyone – and, of course, work would need to be compensated in a fair manner, just like today. It is important to compare such a model to the job market we have today. People who live in less well-off areas often have less opportunities than people living in city centers – a online-based model would eliminate this disadvantage to an extent.

5 <http://innocentive.com/>

6 <http://noisetube.net/>

Autonomous Cars

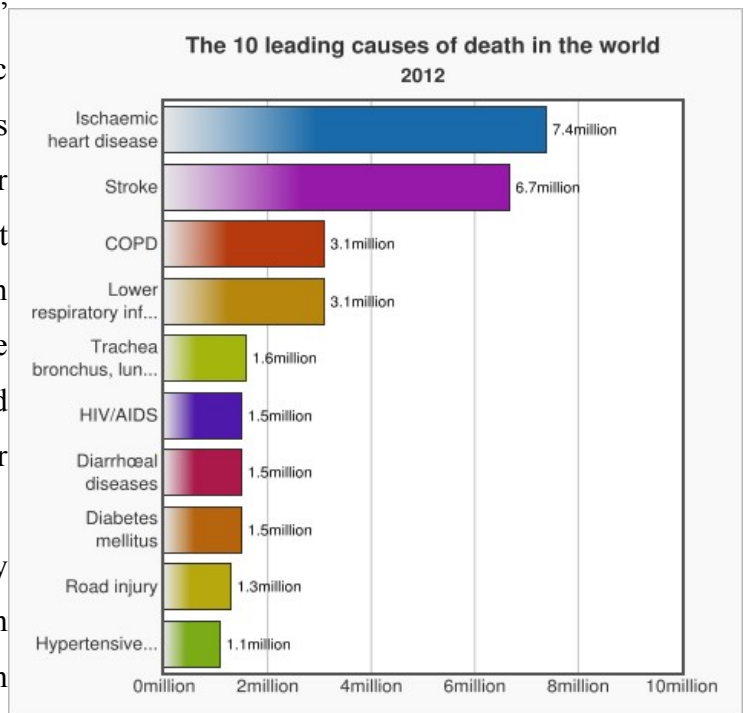
Another example how digital computing will change the way we live are autonomous cars. Many car manufacturers believe that self-driving cars will be the standard mode of transportation in the not-so-far future. Tesla, Google, BMW, Volkswagen and Volvo are just a few companies that actively invest in car autonomy.

An autonomous car is a vehicle that drives without human interaction. The passenger names a destination and the car figures out a route by itself. It then takes the passenger there – safely, if no failure occurs.

There is no doubt that self-driving cars would make transportation easier and a lot more enjoyable for people. Long car rides would no longer be excruciatingly boring and stressful, since travelers could now focus on other things like working, sleeping or watching a movie. As of today, semi-autonomous cars still require the driver's attention (mostly for liability and safety reasons), but it is very possible that cars will actually drive better than humans.

To understand what “Better than humans” means, one has to look at statistics of traffic accidents caused by humans. Car accidents account for 1.3 million deaths per year worldwide, taking 9th place in the top ten list and being almost on par with HIV/Aids with 1.5 million deaths.⁷ At the same time, the WHO lists “speeding, drunk driving and distraction” as the most common causes for car accidents.⁸

These human factors could be eliminated by introducing self-driving cars – the condition being that they function better than human



If one assumes that autonomous cars might one day drive safely without human

interaction, the main causes for accidents could be taken out of the equation for traffic safety – but in order to use this to save lives, we need to put our trust in these vehicles. But how can we trust a computer with our lives?

7 <http://www.who.int/mediacentre/factsheets/fs310/en/>

8 <http://www.who.int/mediacentre/factsheets/fs358/en/>

Democratizing Technology by Providing Accessibility

In order to use technology for humanity's benefit it needs to be accessible for everyone – and, in consequence, should also be created by as many users as possible, in the interests of society. This is how our human community can maintain control over how technology influences humanity.

In my opinion, technology always passed through similar stages: Invention, limited use, privileged use – and finally, technologies become part of humanity's legacy, existing freely for everyone to access and use. Globalization, for example, with all its problems and advantages, is a consequence of world wide travel becoming accessible for everyone. Only a few decades ago, boat or plane travel could only be used by the privileged few. Nowadays, even the poorest of the poor have some access to travel, as worldwide migration movements show.

As technology becomes cheaper over time, more people will get access to it. The question is: will we also be able to get access to the means of making software, of creating, shaping our own digital world, or will it be monopolized by big companies?

Trying to answer this question is difficult, as predicting the future rarely returns reasonable results. But, in order to give the my analysis some ground, I will assume the following trends to become reality:

1. Technology will become more powerful and cheaper.
2. As technology becomes more powerful, its use becomes more common around the world.
3. As its use becomes more common, more people get involved in its creation.
4. As more people get involved, more people understand the processes of creating technology.
5. As more people create technology, more of these people will want to create free, open source software and hardware for everyone to use – just as is happening today.

Free, libre, open source (FLOSS) and Open Source are movements that already exist today – movements that create digital objects that are free to use, change and distribute.

The Open Source Movement – a viable Option for the Future?

Open Source Software is still regarded as a geeky hobby rather than the huge market it is. Since most personal computers run Windows or Mac OS, people do not really see where Open Source software comes into play. But the truth is: By an enormous margin, most software used around the world is Open Source or based on Open Source systems.

Android, for example, is a widely used mobile operating system based on *Linux*, a free, Open

Source operating system created by Linus Torvalds in 1991⁹. 65 per cent of all cellphones worldwide use *Android*. Another example are servers that host websites: 67.8 per cent of all servers in the world use *Linux*. Again, a free software created – at least in its beginnings - largely by volunteers. If you own a Wifi-router in your home, a washing machine or a telephone – they probably run on some kind of *Linux* system.

But how does Open Source work? How can people sustain themselves by doing things for free?

One has to understand that Open Source has come a long way since its dawn in 1983, when Richard Stallman, founder of the GNU project and pioneer in Open Source, quit his job at MIT and founded the “Free Software Foundation”¹⁰. His projects were typical “pro bono” types of work: He called for donations and other developers to help in his ambitions and maintained a certain independence from companies. He created communities of developers in order to make helpful products for the benefit of everybody.

Jesus M. Gonzalez-Barahona, who teaches at Universidad Rey Juan Carlos in Spain analyzed how these communities worked back then as well as today. He found that there are two models – communities of individuals and communities of companies, though “most projects are somewhere in between these two extremes”¹¹. This means that corporate funding does play a more significant role in Open Source software development than it did back in the eighties. Companies invest in free software in order to use it in their products – but at the same time, the created pieces of code are still free for everyone to use for themselves. The company usually makes money by selling this software to other companies and providing tech support for a certain amount of time (these types of contracts are called subscription and support services)¹².

The main characteristics that make Open Source a great tool for shaping an uncertain digital future are its transparency in its development process and the possibilities of participation for everyone who is interested. Since technology only becomes dangerous when it is used against society's benefit, an open digital community would be a useful platform to make future developments easier to handle and prevent abuse of powerful technology.

Applying Open Source principles to the two new technologies that were mentioned is possible, too. Autonomous cars can be used as shared cars – a bit like a taxi, but more efficient since it will know

9 <https://github.com/torvalds/linux>

10 <https://www.gnu.org/gnu/thegnuproject.html>

11 Jesus M. Gonzalez-Barahona, “Trends in Free, Libre, Open Source Software Communities: From Volunteers to Companies”, *Information Technology* No. 5/2013, p. 173, Oldenbourg Wissenschaftsverlag

12 Antony I. Wassermann, “Community and Commercial Strategies in Open Source Software”, *Information Technology* No. 5/2013, p. 182, Oldenbourg Wissenschaftsverlag

where other cars are and automatically use the best route. People will not need their own car, which results in less pollution and less space used by parking lots.

An “open workplace” could mean a model similar to freelance work. It would give more freedom to workers, as they can choose when to work and what to work on. It would have to be transparent and accessible for all workers in order to be true to the principles of an open society.

Conclusion

In the end, one can conclude that the dangers in the digital future are not new. Powerful technologies have always been prone to abuse – gun powder, dynamite or ammonia are prime examples from the 20th century. But that does not mean that these things are evil by themselves. What they lacked was control by society. One might argue that sometimes people might be in favor of war, and thus in favor of aforementioned abuse of technological progress. But in our modern times, I think, there will always be a majority against wars – at least in a global context.

Democracy did a relatively good job at stopping wars. Compared to a few decades ago, humanity has never lived in more peaceful times.¹³

It is our duty as a society to handle new developments with care. And the best way to achieve this is by actively participating in our futures' creation.

This will not be easy, but there are already signs of a generation of people who are willing to shape a secure and open future together. In politics, democracy forces governments to listen to the needs of the people. In my opinion, in technology, the same principle applies – and in the same way a healthy society needs open debate and participation, our digital future requires everyone's active involvement.

13 http://www.slate.com/articles/news_and_politics/foreigners/2014/12/the_world_is_not_falling_apart_the_trend_lines_reveal_an_increasingly_peaceful.html

Literature

1. <http://www.nuernberginfos.de/ludwigseisenbahn-nuernberg.html>
2. https://en.wikipedia.org/wiki/Swing_Riots
3. Prof. Phuoc Tran-Gia, Dr. Tobias Hoßfeld: “Crowdsourcing and its Impact on Future Internet Usage”, Information Technology Magazine No. 4/2013, p. 139-145
4. Prof. Phuoc Tran-Gia, Dr. Tobias Hoßfeld: “Crowdsourcing and its Impact on Future Internet Usage”, Information Technology Magazine No. 4/2013, p. 139-145
5. <http://innocentive.com/>
6. <http://noisetube.net/>
7. <http://www.who.int/mediacentre/factsheets/fs310/en/>
8. <http://www.who.int/mediacentre/factsheets/fs358/en/>
9. <https://github.com/torvalds/linux>
10. <https://www.gnu.org/gnu/thegnuproject.html>
11. Jesus M. Gonzalez-Barahona, “Trends in Free, Libre, Open Source Software Communities: From Volunteers to Companies”, Information Technology No. 5/2013, p. 173, Oldenbourg Wissenschaftsverlag
12. Antony I. Wassermann, “Community and Commercial Strategies in Open Source Software”, Information Technology No. 5/2013, p. 182, Oldenbourg Wissenschaftsverlag
13. http://www.slate.com/articles/news_and_politics/foreigners/2014/12/the_world_is_not_falling_a_part_the_trend_lines_reveal_an_increasingly_peaceful.html

Images

1. <https://commons.wikimedia.org/wiki/File:Opensource.svg>
2. <http://www.who.int/mediacentre/factsheets/fs310/en/>