

# Editorial

The poem “The Road Not Taken” starts off with one of the most quoted lines of the 20th century: “Two roads diverged in a yellow wood, and sorry I could not travel both”. Taken as a metaphor for all those choices we must take throughout our lives, it is a familiar situation for anyone. Some choices greater than other, but all impactful in their own way. These pathways we choose to walk are not only individual decisions: organizations, firms, communities and societies all come across dilemmas. The choices we end up with, the roads we follow, makes all the difference. Pathways reflect on the past, present and future. How did we end up here? Where could we have been? Where do we go from here? These are the questions we seek to explore in this 15th edition of Teknovatøren.

Our past is reflected in the pathways we choose to pursue. The German philosopher, Johann Gottlieb Fichte, once wrote that, “you could not remove a single grain of sand from its place without changing something throughout all parts of the whole”. This connectedness has later become more familiar through the idea of the “butterfly effect”. A small change in any point in time can have great consequences for the future. In his article, Jørgen Aune goes deeper into the innovation history to see how we ended up in a highly technological and digital society.

Sometimes it is important to stop and reflect on where we are. For the music industry, digitalization and piracy led to the fall of record sales and paved the way for Spotify’s streaming service to take over. However, as you can read in Santiago Rufas’ article, the road ahead is still under construction as the Swedish music giant continues to bleed money.

All our choices are taken with the future in mind. During the 21st century it is has become harder to tell the present from the future, and modern TV-series such as “The Handmaids Tale” and “Black Mirror” often feels like a fusion between now and the near future. In “Black Mirror Trickery”, Jørgen Tresse explores how close society today is from the technologies revealed in the series.

More than anything, this edition of Teknovatøren seek to celebrate the possibilities of our choices. “We can shape the future”, as Eirin Evjen writes in her article on how new technology enables us. Technology leaves us with tools to fix, build and create the world we want to live in. It is up to us what pathway we take from here.

Join us on this journey to the past, present and future. And who knows? Maybe, it makes all the difference!



Helge Helguson Neumann  
Executive Editor

# TEKNOVATØREN

## #15

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*Photo: Nora Vilde Aagaard*

(Back row from left): Øystein Fossheim, Helge Helguson Neumann and Jørgen Aune.  
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Eirin Evjen

## Shaping the future we want

*Through science and technology, we have the power to affect the future. This has been true for a long time, but with breakthroughs in gene-modifying technology and the development of artificial intelligence it seems now that we have the power to shape the future.*

A key question we need to answer as a society is what kind of future we desire and should try to create, and then ask how we can make that future happen. These scientific and technological breakthroughs grant us vast possibilities, but with it comes great power and responsibility.

Technologies such as biotechnology and machine learning might require politicians to look further into the future than they do today - and perhaps think more abstract. Gene-modifying technology and artificial intelligence are not only extraordinary because of their complexity and ingenuity. They are also different in that they allow us to radically change things that we have previously taken for granted: our social and economic structures, our genes and what makes us human. These types of transformative technology have the potential to drastically change the world and the beings that live in it, but in order to unleash this potential policy-makers might need to think about what type of future we want.

The act of envisioning what type of future we want is an important one, as it affects how we deal with society and technology today. John Urry suggests in *What is the future?* that envisioning the future is directly linked to the act of realising the future and is therefore linked to power. Because of the transformative and visionary powers of gene modification and artificial intelligence, the applied knowledge in these fields can give unforeseen power over shaping the future.

In her essay *The Cyborg Manifesto*, Donna Haraway gives us a peek into how truly transcendent technology and humans interaction with it can be. Haraway portrays a future in which technology has enveloped us, and the result is a society with new societal norms, social and economic structure and values. This essay challenges the divisions and boundaries of race, gender and humans in general, and in turn challenges us to think what we would like a world free from the social structures we know to look like.

All this now begs the question: who should have the power of envisioning the future? According to John Urry, this should be the social sciences. This is because futures are intrinsically social - they say something about our shared purposes and common goods. Envisioning the future entails (re)imagining how we want the society to be. This too, is the purpose of the government. How we want



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the future to be is therefore something we should expect the government and politicians to focus on, perhaps especially now that we have the technology with the potential to transform it.

There are multiple frameworks with which we can make sense of how our view of the future shapes policy today. There is for example sociology of expectations as put forth by Nik Brown and Mike Michael in their article with the tongue-twisting title *Sociology of expectations: Retrospecting prospects and prospecting retrospects*. This framework allows us to see how past expectations and views of the future shape policy today and how we view the future now. Further, the concept of anticipatory governance shows how future scenarios inform preventative and progressive policies. There is also Sheila Jasanoff and Sung-Hyun

Kim's notion of sociotechnical imaginaries, which tries to explain how shared notions of a collective goal or desired future co-produces policy today together with technological and scientific developments.

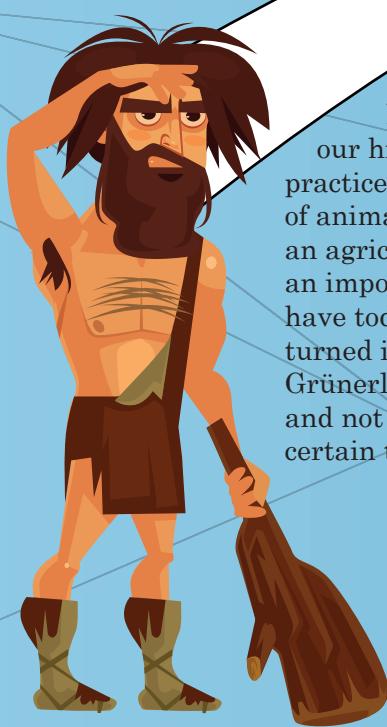
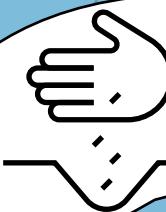
Envisions of the future, both desired and undesired futures, shape how we act and prioritise today. Desired futures tell us what we are optimising for, and undesired futures can either tell us what not to do or what we need to actively prevent from happening. It seems like gene-modifying technology and artificial intelligence has the potential to transform our reality, and therefore also our future. Because of this, we should not only think more about the future we want, but also start getting creative.



Jørgen Aune

# A journey through history of innovation

I often use the tram in Oslo, and couple of times – when I'm in a philosophical mood – I look out the window and wonder how humanity developed into a complicated society with smartphones, cars, bikes and street lights. How did we get here, and could my view from the tram have been very different with small changes in human history? These answers are not easy to find, but if we can see beyond historically important inventions like the internet, the computer and electricity, and focus on the mechanisms behind all kind of inventions, the continuous innovation process, we may find some interesting insight.



The studies of innovation are quite new in human history, but the practice of innovation has been there throughout most of our history. In the stone age, routines and practices were developed to take advantage of animals and plants. This led the way into an agricultural society, which – of course – is an important step towards the society we have today. But the story of how our world turned into the world I see from the tram at Grünerløkka, is the story of innovation itself, and not the story of certain inventions at a certain time.

One of the most important parts of innovation is our ability to understand and learn from our surroundings. We use our senses to take in information, and we use this information to learn so we're able to change our behaviour into something more efficient. For thousands of years the human behaviour did not change radically, and one of the reasons for this is the lack of new information to learn from in our

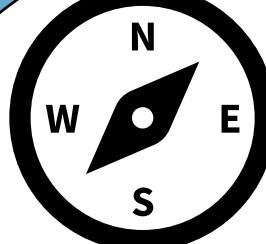
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surroundings. Stone age societies and early agricultural societies can be characterized by small groups of people living together in more or less the same environment as their ancestors. When you have access to the same knowledge and environment as your grandparents, it's not easy to find radically new solutions to your problems. To increase the rate of innovation something had to change.

This important change came when humans began to settle down in fixed settlements as a consequence of more efficient food production in the agricultural society. The semi-nomadic society made it possible for humans to own more stuff, because they didn't have to move around carrying what they owned. Therefore, it was possible to develop technology and products which was heavier than before, in a bigger scale. This may be the reason why industries like pottery and weaving became big business just after humans had settled down in villages. Another effect of fixed settlements

and efficient food production was the ability to specialize the workforce. Fewer had to work in food production, and more people could focus on other professions. This combination of more people living together – competing and sharing knowledge – and the ability for specialization and dedication, laid an important foundation for the innovative society.

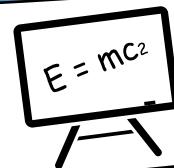


People living in fixed settlements with more people than before gave a lot of synergic effects on innovation, and especially when villages became bigger and connected through trade in the middle ages. Towns and trade gave certain societies what they lacked: access to different products, beliefs, ways of organizing society, as well as different ways of thinking and solving problems. This diversity created competition, which made it necessary to learn from each other to avoid economic stagnation. In innovation language we call this sharing of knowledge, and the development of modern towns was essential for this in human history. Towns became a place for new thoughts and ideas, which we needed to be able to learn and change our behaviour.

Fixed settlements and trade was important for society to reach a higher level of sharing. But this isn't enough for the innovative society. In

the feudal era in the middle ages, competition and trade was low due to the system of guilds and trade based on personal relationship between monarchs and nobilities. These traditions prevented the sharing of knowledge at a high level. When the mercantilist era grew out of the feudal system, nations became stronger and the merchants got more power. The strongest nation had the strongest town, with most trade and the best products. An example of this can be found in the European textile industry. In the 17th century, the

income relative to landowners, which gave more focus on the quality and price of products over personal relationships. In the same period, we see huge changes in people's minds. There were new views on both religion and science, which made the reformation and the scientific revolution possible. This would probably not happen without the heterogeneity created by towns and trade in the same period. Changes in religious beliefs made it possible for humans in the western world to act and behave in new ways, and science was



North-Western Europe became the leading geographical area of the European textile industry. They copied some of the earlier manufacturing techniques and improved it by using lighter fabric with more colours, which fitted the market demand better. They also organized the whole process of production in a more efficient way. All the way from ordering materials from farmers to sales of the final product. If some other towns wanted to compete, they had to learn and become better, just like the north-west of Europe had done. Humanity had taken the step into a society of innovation.

From 1500 to 1650 prices tripled in Europe because of imported gold and silver from the New World. This gave merchants increased

necessary in a diverse society with different theories which had to be tested. Later, in the 18th century, we also got increased critic of government, which laid the foundation for democracy.

The process of innovation may seem complicated in the modern world, and they are. But even the most primitive societies did develop innovations, because in the end, it's all about how we think, behave and interact with each other. So, the next time you look out of the window from the tram and wonder why all you see could grow out of a nomadic stone age society, you can think of the power of innovation, which is the power of people working together, sharing and creating.





Johanna Foss

## Disputing consensus

*When consensus is presented as certainty, climate researchers make themselves an easy target for climate sceptics who want to call their conclusions into question. What is the significance of consensus in the climate debate? We asked Erlend Andre Tveiten Hermansen, currently a senior researcher at Cicero.*

**Several scholars working in the STS-field have criticized climate researchers for focusing too heavily on the so-called 97 percent consensus among climate researchers that climate change is manmade. Why has it been so important to convey this consensus?**

I partly disagree with the critics claiming that the focus on consensus was totally useless. There are reasons why this kind of rhetoric was useful, and perhaps particularly at that time. Organized climate scepticism was more visible and influential, powered and funded by strong vested interests who found it opportune to exaggerate scientific uncertainties and deliberately cast doubt on well-established scientific facts. Doubt and uncertainty can suspend action. As a countermove to these forces, different groups of scientists started to count consensus. If you are to instigate political action on such a contested field as climate change, you have to get across the message that we're pretty sure that we are facing a serious problem. I would say that the



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story about the 97 percent has contributed in that regard and brought wider and broader attention to the climate issue. But of course, then it's the issue on how you actually count consensus.

**But then, when some questioned how precise this 97 percent estimate really was, would you say that focusing on that very number was harmful to the cause?**

It's a gamble. Citing numbers may be effective, but when the numbers suddenly are questioned, doubt may be fuelled, which again might divert the attention from the real issue. But the point is not really whether it is 97 or 77 per cent, the point is that the vast majority of active, publishing climate scientists support the hypothesis that most of the observed warming the three-four last decades is manmade. And that hypothesis seems to be more established than ever. Put bluntly, the climate debate has turned from whether we actually have a problem, to what we can and should do about it.

**The STS field does research on controversies and questions the extent to which one can be objective even within science. Regarding climate change, do we really have time to listen to your analyses?**

That we're hung up on controversies and problems, you mean?

**Yes, could it be that this kind of research may slow down the process towards solutions?**

It has been debated whether STS research can be used by for instance climate sceptics for underpinning quite absurd beliefs, and whether STS has played a role in the so-called "post truth" age. In my opinion, one

of the primary assets of STS is to enable reflexive learning as you go along. This kind of approach is very important as technoscientific societies embed so much uncertainty of different kinds, and particularly when there is much at stake, as with climate change. The uncertainty regarding manmade climate change has been massively exaggerated and also exploited by the fossil fuel lobby. And we can say that, precisely because we have done much scientific research on that topic.

At the same time, it's important to make the climate models more transparent regarding the methodological assumptions underlying the conclusions we draw and which we base our responses on. In a democracy, politicians, citizens and broader society should be well-informed about how we arrive at our conclusions. Core assumptions may have profound consequences for the output of say a climate model. For instance, has climate sensitivity – how the atmosphere responds to a doubling of the CO<sub>2</sub>-concentration – been scientifically debated for more than a century. And there are still uncertainties. Often such factors are represented as a median. But in risk management, one also has to pay attention to the tail risk, for instance low probability but large consequences, or vice versa. How should a society handle such issues? I think STS has many lessons to offer in such debates, having studied science-policy interactions as well as risk and uncertainty management for decades. To democratize science and open up controversies for public deliberation are key messages from STS.

**To what extent can you be uncertain and at the same time push for political action?**

It largely about interpretation. For instance, European countries in principle have access to the same research, but the research is



interpreted and assessed differently. In Poland, for instance, climate change is close to a non-topic. Like Norway, Poland's economy is dependent on fossil fuels. Both countries have in principle access to the same information from say the IPCC, but only Norway has climate change on the political agenda, to put it bluntly. The question of how much or little knowledge we need to act on is impossible to answer, but we must explore how these phenomena are connected. I think STS research has documented well how science and uncertainty is judged differently in different contexts, and how that may have profound consequences. But in my opinion, we cannot just be critical from the side-line and not take part in the discussions. We need to contribute by promoting a "double reflexivity" perspective: participate, but also evaluate.

#### **What about the climate sceptics in Norway?**

There are various forms of climate change scepticism. A few insist that the climate does not change at all. Others acknowledge that it's getting warmer but argue that these changes are not manmade. Others again argue that it will be too difficult or costly to do something about it, even though it's manmade and possible to do something about. We need to take into account the range and nuances of scepticism. From 2007 till today I'd say that the political debate has changed from the question whether climate change is manmade or not, to what possibly can be done with it.

#### **What would you wish to see more focus on regarding the climate issues, for instance if you had designed this interview?**

I miss a broader societal discussion about how Norway should contribute with a fair share in dealing with climate change, as seen from an international perspective. We still have a way to go in that regard. Although climate action is higher on the agenda in most

sectors in the wake of the Paris Agreement, it is still primarily the Ministry of Climate and Environment, the Environment Agency, a handful of NGOs- and researchers who drive the debate. The broader layers of the population and large parts of the private sector do not seem to adequately take part in the discussion. I doubt that we are able to make the necessary changes in the Norwegian society until we have a broader public debate.

**Sustainability, a “green shift”, my impression is that we are moving forward?**

The green shift and sustainability.... These are broad concepts which are easy to endorse, but what do they actually mean? I'd say such concepts function as camp fires; they are something some of us gather around and talk and discuss, but there are often parallel discussions, which do not necessarily pull in the same direction.

**So, the «green shift» should perhaps be a protected label?**

Here's a sort of a parallel to the question of consensus. Establishing consensus won't do the job itself, but it may contribute to establish the issue and move it up the societal agenda. I think it's a bit similar with the green shift: it may contribute to get the climate issue on the action agenda, but in the end, action agendas come in plural – and not everyone will agree. For instance, some argue that more gas is part of a green shift, while others would strongly disagree. The concept of the green shift also points to how there are certain dangers related to buzzwords and simplifications. Talking about “green shift” has pushed the issue and has perhaps moved us forward in a certain direction. But what's next? We have a problem if the majority of the population believe that we're well underway in the process of a green change. Because we still have a long way to go.





Kate Pashevich

# Playing with robots: When toys become intelligent

*Je suis de mon enfance comme d'un pays.*

- Antoine de Saint Exupéry

We all are formed by our childhood. As well as our bodies, our character and behaviour develop during the first years of life. A huge part of our early lives takes place in formal learning institutions like comprehensive schools, various clubs and thematic schools. What we often don't realize is how much we learn outside of those institutions, informally. Usually it happens in a form of play, where we learn to communicate with the surrounding world and with other intelligent creatures. People are social animals, and social intelligence is crucial to develop in order to live a happy life. But what if social intelligence can be created artificially, for example, in "intelligent" toys?

## Why toys?

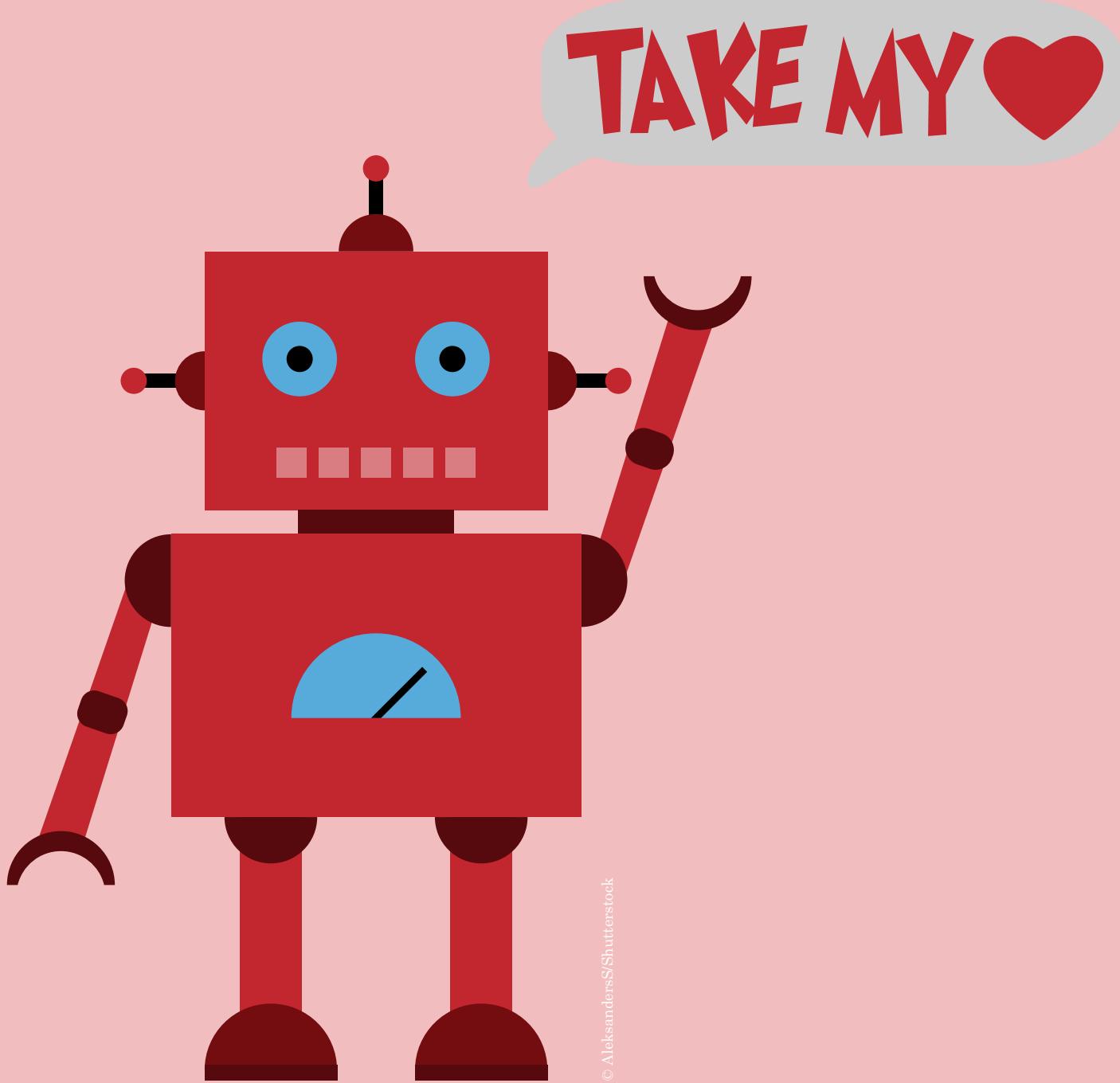
What is the role of toys in our lives? It is inextricably linked with play, which is a very important activity, and not only for children. Huizinga even argued that play remains relatively the same among the majority of mammals, some birds and insects. In the human society, some forms of play are later transformed into our cultural and social institutes, like science, judicial system or medicine. Children don't really need toys. In fact, there were no toys (or for that matter any objects specifically designed for children) before the late 18th century. Children used to

play with each other, but the modern industrial society left children steadily more alone. This is when toys came to the scene: they help children learn and develop their imagination in the absence of adults and playmates.

Children tend to develop strong emotional bonds with some of their toys. Scholars talk about "transitional objects" – toys we take with us from childhood to the adult life. The majority of us don't like to admit they still have that teddy bear, let alone acknowledge that somewhere deep inside, against all the rational arguments, we know: that bear is alive. Children psychologists heavily argue about what kind of toys children should have: Should they be simple or highly technological? Should we allow children to play with guns? And how would these toys influence children's behaviour in the future? Probably, we should just ask children, what they want.

## The market of AI toys

Today the market of children's toys is full of "smart" or "intelligent" toys that can walk, talk, move objects and answer children's questions. They are engaging and useful. However, there are several big questions regarding how these "intelligent" toys are being designed and regulated. Some of them are on the surface: privacy and security issues. Norwegian Consumer Council (Forbrukerrådet) last year launched a campaign against "interactive" toys ("My



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Friend Cayla” and “i-Que Intelligent Robot”), pointing out they’re not very well thought through design: these toys recorded children’s talk, and there were no clear guidelines regarding how this information is being stored and transmitted. As a result of the #ToyFail-campaign, the doll “My Friend Cayla” was taken off the market in Germany in 2017. This is a good example of how industry is always moving faster than the regulation. At the same time, strict regulation can hinder innovation. In order to prevent such events from happening, designers should consider not only their commercial interests, but also the interests of their customers. In this case, children. What is good for them?

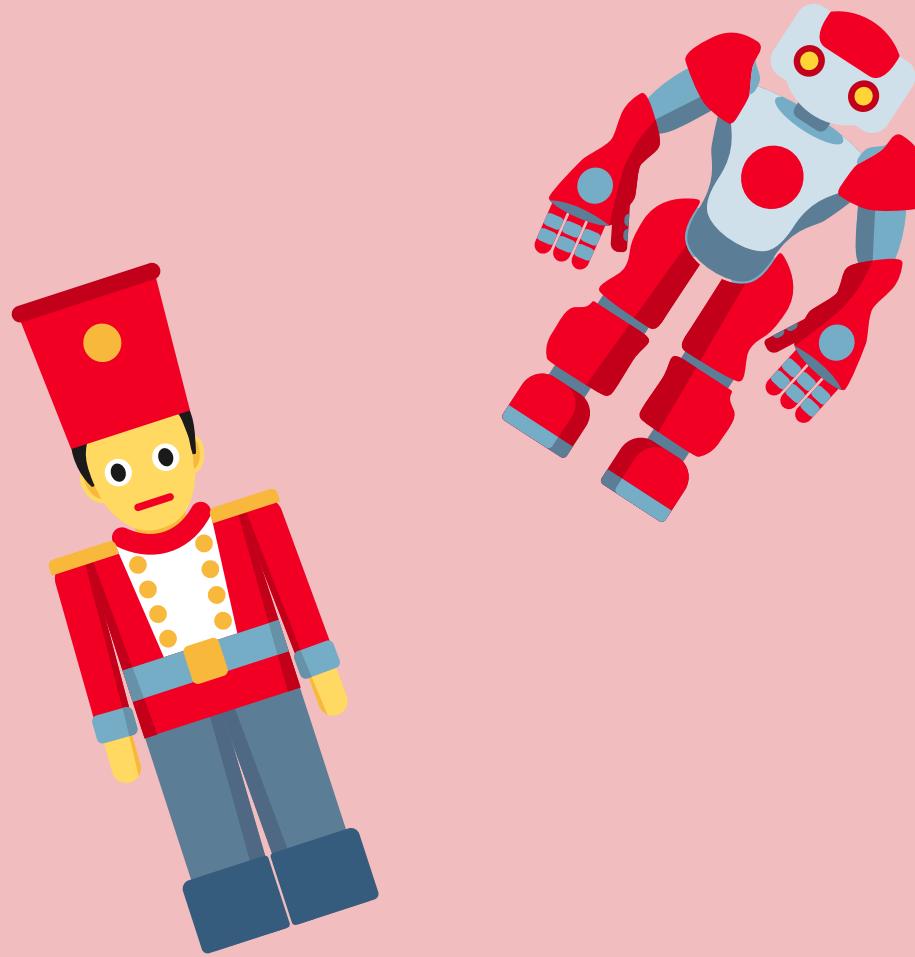
#### Simulated intelligence

Robotic toys are now even able to possess certain personalities, like the Cozmo robot, which sometimes refuses to do his tasks and gets angry. While gaining more and more social intelligence these toys can lure children into thinking they are communicating with a living thing. Sherry Turkle in her book “Alone together” raises a question of how differently children perceive objects with artificial social intelligence. She writes about her daughter for whom a robotic animal was just as “real” as a living one. The experiment at MIT Media Lab, where children were



observed and interviewed while playing with different “intelligent” toys, showed that children perceived these toys as “friends” or “teachers”, and thought of them as having various personalities.

What does it take for children and for us to be tricked into thinking a machine has intelligence? One of the pioneers of the field of artificial intelligence, Alan Turing, was occupied with this problem. He suggested a test or the “Imitation game” (later called the Turing test), where a machine, without being seen, only by answering the questions, needed to trick the human interrogator into thinking that it was a human too. Today, there is a whole field in computer science studying the design of socially intelligent agents (SIA). By “agents” they mean algorithms that are not just passive “tools”, but which possess a certain “agency”. The authors of the book “Socially Intelligent Agents. Creating Relationships with Computers and Robots”, Dautenhahn, Bond, Cañamero and Edmonds say that, since there exists no known “objective intelligence” outside of the experience of a human observer, the task for the designer is more to make it “seem” intelligent rather than to recreate an actual intelligence. Which makes the task much easier, but creates a major ethical concern: when



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we interact with SIAs, are we always aware that they simply simulate intelligence? And, in our case, do children understand that while playing with such a toy?

#### Effect on children

How do children perceive, interact and communicate with toys that steadily become more intelligent? The current research shows that children still prefer playing with their human friends to playing with any kinds of toys. Can this change? Will we come to a point where “intelligent” toys will replace living playmates? Another important question with such toys is: what kind of effect they have on

children’s learning about the world? These toys are permanently connected to internet and can retrieve any recorded knowledge, but how do they deliver this information to children? Again, a question to their designers. Last but not least, how will the presence of robots from the early days of our lives influence our perception of real and simulated feelings and emotions? Play is a tricky thing: when we play we do realize that it is just a play, yet we are serious about it. If we don’t take the play seriously, it easily falls apart. With “intelligent” toys, will children still be able to draw a distinct line between play and real life?



Jørgen Aune



Helge Helguson Neumann

## Balancing academia and business

At TIK, the link between academia and business is important and works both ways. For the last seven years, Telenor and TIK have been partnering up to understand innovation. Teknovatøren had a chat with some of the actors from both sides to discuss cooperation between academia and firms.

Although there have been close links between universities and private sector for a long time, their explicit differences make it appear as though they exist on different planets. This impression might be tied to the perception that academics are working to discover new knowledge, while private companies are concerned with growth and profits. Different motivation leads to different working methods and routines. However, in today's society, with digitalization, globalization and rapid innovation, academia and the business sector are partnering up for mutual benefits. One such collaboration is the 7-year long partnership between the telecom company Telenor and the research centre TIK.

Historically, Telenor has been closely connected to science. Before Televerket became Telenor, and before the modern Research Council of Norway was established in 1993, Televerket operated as the "research council" for the telecom industry. This tight connection between Telenor, and the research sector has been maintained in the last decades. "There is a tradition in Telenor to

be a progressive company. To be innovative and reach new markets, you need to be able to absorb external knowledge. Thus, collaboration between universities and firms can be decisive for innovation" says Dagfinn Myhre, head of communications and external relations at Telenor Research.

Magnus Gulbrandsen, professor and head of the innovation group at TIK, has done research on collaboration between actors in systems of innovation. He argues that collaboration between universities and firms can be important within an innovation system, but its effectiveness depends on several factors. A key for a successful partnership is to recognize mutual benefits, differences, and potential tensions. "Trust is also important; it takes time to build and requires patience". Gulbrandsen also highlights the importance of informal connections between the industry and academia. "There needs to be a balance, academia needs to prepare the students for what is expected to solve societal problems. At the same time, academia represents a neutral environment where it is possible to be creative and think long-term to a greater extent than in the private sector".

This same understanding of balance is also present at Telenor, where there are discussions about the bilingual scientist: one that knows the language of both academia and business. Jarle Hildrum, head of service



innovation and former researcher at TIK, has experience from both worlds. He also reflects on the importance of having an innovation-environment where you are able to see long-term. "There are many examples, also at Telenor, where new ideas and products have failed. But we still need to explore those ideas to keep innovating and growing". Myhre adds that this idea of long-term exploring is important in academia as well. "Universities needs to build a good foundation. We need employees who have a generic competence. I don't think business, or the academic communities prosper from too applied and short-term science".

The success of Telenor the last decade has been a result of an innovative culture in the company. Myhre addresses the importance of individuals with an innovative mindset. "There has been an entrepreneurial culture with strong industry-oriented individuals who succeeded with Telenor's international expansion. They know technology, but they also know markets and business. These individuals have been the engine of our growth." This kind of culture is a significant ingredient in the creation of growth, but this culture also needs input. "We want to build up scientific communities we can

work with, because we sometimes need to think differently and get new perspectives. For example, we can talk to TIK if we want to discuss and learn more about the understanding and measurement of innovation." The collaboration between firms and academia creates a bond where the firm gets essential inputs, while the science institution gets valuable insight in how the firm works. Over time, this mutual understanding can give an even better cooperation as the two parts benefits from each other.

Individuals are important for the cooperation between academia and firms. Some scientific institutions only want to get the contract signed and to deliver a report in the mailbox at the end of the contract, while others are very interested in the firm and eager to discuss and have meetings. What kind of relationship there will be between academia and the firm often depends on individuals. "Personal relationships are essential for how fruitful the collaboration will be. The collaboration works best when individuals in academia really care about our challenges." Myhre says. Maybe that is why the collaboration between Telenor and TIK has been so successful for the last seven years.



Santiago Rufas Rípol



# Spotify: The Story of a Limping Unicorn

Spotify went public on April 3rd, 2018. Wall Street greeted the newcomer by mistakenly raising a Swiss flag to welcome the Swedish giant. More than a giant, Spotify has been referred to as a unicorn. In the financial world, a “unicorn” is a start-up valued at over a billion dollars and denotes a once-in-a-generation firm that has the potential to change the landscape of one or many industries.

However, change has been difficult for the music industry as it struggles to cope with disruptive technologies. After fighting piracy for over a decade, the focus has now shifted to streaming as the most viable path. That does not mean that there are no tensions going on between the music industry and streaming services such as Spotify. In its first ten years, Spotify's achievements fall nothing short of mystical, but how well is the unicorn really doing?

Spotify may have saved the music industry by offering a valid alternative to piracy. To this date, Spotify has over 170M users and grosses \$5Bn in revenues. In Norway alone, streaming accounted for 77% of music sales. But at what cost? In 2017, Spotify's bottom line revealed a staggering \$1.5Bn loss. To add injury to insult, a bunch of lawyers have decided to sue the company for \$1.6Bn over a copyright dispute. Why is Spotify losing so much money? It seems that the unicorn is carrying the burden of

pricey licensing deals that ultimately provide us with our favourite tunes whenever we want, wherever we want.

Spotify has continued to rock the world since entering one of the most brutal industries in the world in 2008. The unicorn is limping because the game is still on and as long as it runs, it will remain bloody expensive. Spotify has achieved step one: to offer a valid alternative to piracy. Not so long ago, piracy had made the music industry sleepless for almost a decade. One thing we learned is that the industry did not, does not and will not accept “free” access to music. After all, there are too many resources pooled into the production of music content. In 2018, the record industry is growing for the fourth year in a row, a clear sign that things are moving in a positive direction. While streaming gets credit for this surge, the foundations for its success were laid down in the turbulent age of piracy.

In order to better understand today's context, we first need to look at yesterday's events. While Spotify is one of the latest examples of how technology can disrupt an industry's landscape, others have tried before. Only that most of them are not limping – they are dead. Chances are you have heard about Napster, a revolutionary peer-to-peer network that allowed users to share their favourite tunes online for free. Artists, labels and



everyone except the users were horrified as they saw their music wandering freely on the net beyond the confines of copyright law. As revenues plummeted, the music industry engaged in a crusade against piracy, ultimately drowning Napster in a midst of lawsuits over copyright infringement. Hero or villain, Napster was made an example of. A precautionary tale to whoever dared to engage in piracy.

Today, many see Napster as a pioneer, a firm that existed before its time and for which the world was not yet ready. As most pioneers, Napster was slaughtered, but the idea of enjoying music whenever and wherever remained in people's minds. Just like a restless ghost, piracy continued to haunt the music industry long after Napster's death... until its reincarnation in 2008. Spotify can be seen as Napster 2.0, only that it has established collaborative stances vis-à-vis the music industry and remunerates creators.

The unicorn appeals to both industry and consumers with its innovative business model and user-friendly platform. While streaming stopped the bleeding by providing a valid alternative to piracy, there are still many questions to be answered.

Today, we have more access to music than ever before. Digital technologies have opened Pandora's Box and there are some disturbing signs moving forward. Increasing consumption has not yet fully translated into a "healthier" industry. Through 2017 Spotify said it has paid \$9.8Bn to musicians, but the money does not seem to get there. Therefore, the question remains: where is all the money going? How can the music industry better adapt to disruptive technologies? While Spotify has managed to convert previous pirates – such as myself – into paying users, the issue of monetising streaming remains an urgent matter.



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Today, the path towards a fairer, more sustainable music industry seems more viable than it ever. Users, technology and industry finally seem to be moving in the same direction. Unlike piracy, streaming allows us to enjoy our favourite tunes at our fingertips without undermining creators. After all, it is only fair that artists see the fruits of their labour. With the help of a unicorn, shouldn't this be feasible? Spotify is certainly up for the challenge, but it cannot do so on one leg. The music industry remains reluctant to change, still unfit for the digital age and Spotify seems to be at the forefront of this tension between industry and technology. Things are getting better and if the unicorn continues on its journey, it should be able to heal its wounds and start leading the way full throttle towards a fairer, more sustainable music industry.





Jørgen Tresse

## Black Mirror Trickery

Charlie Brooker's often dystopian and technology-driven thriller series Black Mirror is a must-watch for anyone interested in technology and society, not least because we might already be living it.



Black Mirror, which airs on Netflix, is one of the most talked about shows the past couple of years. This is not just because it's a well-written and well-directed show, but because it raises questions about our use of technology and where we are headed in a remarkably prescient and timely way. It shows us different, often dystopian futures where plausible technologies have gone wrong, and how it can augment the worst parts of the human psyche. If you watch the series, you might enjoy the entertainment, but ultimately write it off as just that, and that's why this article exists. I aim to show exactly where we currently stand on some of the so-called Black Mirror-tech, and to which extent our world already is Black Mirror.

**Technology:** Creating or uploading a digital copy of your mind

**As seen in:** "White Christmas", "San Junipero", "USS Callister", "Hang the DJ", "Black Museum"

**What it does:** Variants on technology that creates digital copies of the mind are some of the most pervasive in the series, and so are lumped together. The copy has all the memories of the owner and is often under the impression that it is the original mind, and not a copy. In the series this opens up for ethically ambiguous and otherwise horrible scenarios involving torture, inhumane interrogation methods and enslavement of the copy.

**Real-life comparison:** While not at the point where we can copy our minds to a digital computer, or live a happy afterlife through our uploaded selves, attempts at finding ways to integrate our minds with computers are well underway. Perhaps the most prominent example is Elon Musk's Neuralink, which aims at implanting a brainwave-reading mesh

that will connect our minds to computers. But if this succeeds, will an eventual digital copy of us have the same rights as our physical selves? This is a technology that begs us to find an answer to the age-old question of what makes you you.

**Technology:** Killer robots

**As seen in:** "Hated in the Nation", "Metalhead"

**What it does:** In "Hated in the Nation", small robotic bees are weaponized and used to kill whomever is deemed necessary through online voting polls. In "Metalhead", normal civilization has broken down as robotic "dogs" roam around and kill any people they encounter.

**Real-life comparison:** Autonomous warfare has been described as the third great revolution in warfare, after gunpowder and nuclear weapons. It's easy to imagine that once warfare becomes effortless and for all intents and purposes free, we will see a lot more of it. So, look no further than the new videos from Boston Dynamics to welcome the ancestors of our future robot overlords. With robots that can do back flips or that look eerily like the killer dogs in Black Mirror, it's hard to believe any argument that these will never be weaponized. It may be true for the time being, but remember that the U.S. military drones used in the Middle East were also initially simply surveillance drones.

**Technology:** Simulating the dead by analysing their social media profiles

**As seen in:** "Be Right Back"

**What it does:** An AI built to simulate the dead which the bereaved can talk to. It's also possible to get an android that looks and acts like the deceased person.

**Real-life comparison:** While we don't have



androids to implant them in (yet), there have been several attempts at making chatbots which act like those who have passed.

Eugenya Kuyda made a bot called Replika, which mimicked her best friend, while James Vlahos made a “dadbot” of his dying father. Furthermore, services such as Eter9 and Eterni.mi creates a digital counterpart of you either by scraping your social media profiles or through your interactions with them, so be aware that what you post on social media might determine “your” personality forever.

**Technology:** Surveillance of children

**As seen in:** “Arkangel”

**What it does:** Another implant, this one allows a parent to look through the eyes of their child and follow their every move from a tablet. Furthermore, the parent can censor sounds and images, so that they appear just as a blur to the child.

**Real-life comparison:** Again, the implant technology is missing from our life, but there are several quite comprehensive parental control apps that will do much of the same work, such as PhoneSheriff or Norton. These apps, in addition to giving real-time location updates, can control which apps are usable on the child’s phone, and for how long. Seeing as how much of young people’s lives are lived through their phone, this is probably the closest thing we have to Arkangel for the time being.

**Technology:** People rating

**As seen in:** “Nosedive”

**What it does:** Like rating restaurants on Yelp or movies on Netflix, people have a contact lens which allows them to real-time review others, and in turn be reviewed themselves. Rated on a scale up to five, your social score determines which reservations you can

make, bank loans you can get, and modes of transportation you can take.

**Real-life comparison:** While there have been attempts at making apps for people rating, such as Peeple, the by far largest and most disconcerting instance of this technology is underway in China. Launched in 2016, and until 2020 voluntary to be a part of, the Social Credit System gives every citizen a score not unlike modern credit scores. Your score decides anything from whether you will receive a visa for travelling abroad to which schools you (or your children) can attend to where you will be allowed to live. While the algorithms it uses are not public, it’s reasoned that one of the factors which affect your score is not just what you say online and in public, but what your contacts say. Just imagine what Erich Mielke would have given for this technology. All the same, if you can accept that this happens in China – a country with a history of oppression and control – you would reflect on how many things we do now that were unacceptable just five years ago. The pressing question is not if China’s system can be implemented here as well – it’s when?

Black Mirror plays with a myriad of different technological possibilities, but the show is ultimately about human relations, actions and desires that are made possible – and worse – by technology. As all good dystopian fiction, it warns us of what may happen if we are not careful and aware of both the direction of technology and our own psyche. If we are able to do that, we may still stand a chance to avoid some of the worst possible scenarios painted in Black Mirror.

# Three from TIK



Emilie



Gard



Ingrid

## Emilie Margrethe Skogvang

Masters program: TIK  
Graduation year: 2018

### What was your thesis about?

I conducted a case study of the UN Women Blockchain Project to Empower Women and Girls in Humanitarian Settings. The thesis focuses on how the collaborative relationship between UN Women and blockchain companies evolves in a radical, high-tech innovation process, and what factors supports and constrains collaboration between the UN and the private sector in innovation.

### What is your current occupation, and how do you use your background from TIK?

During the course of my masters I worked part time at Innovation Norway in a unit called NOREPS, which works with humanitarian innovation. After submitting my thesis I will start working full time in the Innovation Norway communications department. I will use my TIK background to communicate how Innovation Norway can assist Norwegian start-ups and growth companies in innovation and development.

### What is your best advice for new or prospective students at TIK?

Apply for relevant internships and part-time jobs! I had an internship in the environmental foundation ZERO, and a part time job at Innovation Norway, which made the theories we learned much more applicable and understandable for me. The work experiences also helped me decide what I wanted to write about in my thesis. Writing for Teknovatøren is also valuable to get more writing experience. Oh, and also.. enjoy the ride!

### Gard Nordby

Masters program: ESST  
Graduation year: 1999

#### **What was your thesis about?**

I wrote about Innovation practices within the Norwegian Cluster for Oil and Gas. Basically, all innovation theory and literature on innovation at the time focused on product and technological innovation. I applied acknowledged innovation theory on three different cases within the Oil & Gas cluster: A pure helicopter service provider to the industry, a public regulator on the Norwegian Continental Shelf (NCS) and a leading technology solution/product provider. Even though the innovation process differed a lot, the theories were still quite applicable.

#### **What is your current occupation, and how do you use your background from TIK?**

I work as a management consultant within strategy and restructuring for Capgemini Consulting. My background from TIK/ESST is more of a foundation and perspective than being empirical know-how I can use on a daily basis. I do however work a bit in the interface between politics, public management and business performance, and the background from TIK and UiO proves valuable.

#### **What is your best advice for new and prospective students at TIK?**

Be curious and open. Raise critical questions and challenge conventional thinking. I sense that many students today (generally speaking) are too oriented of absorbing information, information that they believe will be useful know-how on the day of the exam. I would like to see more critical thinking, challenge of beliefs and creation of discourse. TIK/ESST should provide the set up for it – and it will improve learning and understanding for you and others.

### Ingird Paaske Gulbrandsen

Masters program: TIK  
Graduation year: 2018

#### **What was your thesis about?**

In my thesis I used a combination of two theories/methodologies from the field of impact studies to examine the process where scientific knowledge is made applicable (and therefore enable social impact). My twist to the methodologies was to relocate focus from the interactions between researchers and stakeholders, onto investigating the importance of interactions between different stakeholders in applying scientific knowledge to their practices. In my thesis I identified communication structures and tools for spreading knowledge effectively used by stakeholders to enable the usage of new knowledge. My case was the implementation of Individual Placement and Support in NAV, a scientific methodology for supported employment for people with severe mental illness.

#### **What is your current occupation, and how do you use your background from TIK?**

I work as a consultant at Rambøll Management Consulting in the department of Social and Economic impact. My background from TIK combined with my former education has provided me with interdisciplinary perspectives and tools as well as a deeper understanding of innovation processes.

#### **What is your best advice for new or prospective students at TIK?**

Find a relevant job while studying. Remember that relevance in this case could be more important than salary in the long run. Other than that; build your CV - engage in Teknovatøren!



Nora Vilde Aagaard



# Mobility as a service

- Do we have to choose between  
privacy and sustainability?



Imagine you are waking up on a normal Tuesday. You pick up your phone to check the news as usual. A notification is blinking, and you learn that your train to work has been cancelled. You know that you can take the bus, but you also know that the bus takes 30 minutes longer and will make you late. Luckily, your mobility app tells you that a cab is nearby, ready to pick you up. And guess what? The cab is free!

What might sound like a dream is in fact reality. There must be a downside to this free cab, you may think, and not surprisingly, there is. In order to receive the free cab, you must give your mobility app access to your calendar and permission to save information about the trip you are about to take. Perhaps this does not sound alarming to you, but what if you knew that from the second you agreed to the “terms and conditions”, which nobody really reads, that you had actually agreed to let your mobility app collect and sell every piece of data about where you travel.

Our current mobility system, characterized by automobility, has allowed our whereabouts to be anonymous for decades. We get in our cars and drive without anyone having to know

where we are going. Now, with the mobility system changing, what changes prevails and how these will affect our everyday lives is still unknown. The current tendency is characterized by a more centralized, shared transport, especially in cities.

The Finnish company, Mobility as a Service (MaaS), got the brilliant idea to combine different modes of mobility in the Whim app. Citizens of Helsinki now only need one app to use city bikes, public transport and car-sharing services. MaaS’ goal is to become a global mobility provider, starting by expanding to the UK. By first glance, the Whim app appears genius. One single app to get access to public transport, city bikes, cabs and car-sharing services. Also, the monthly price of the Whim services are lower than buying a monthly bus pass from the municipal public transport provider in Helsinki, HSL. This is possible due to the investors of MaaS, Toyota among them.

In order to use the Whim app, you need to give up a lot of your personal information. For the app to work properly, you have to allow the app access to your phone calendar and your current position (which also stores



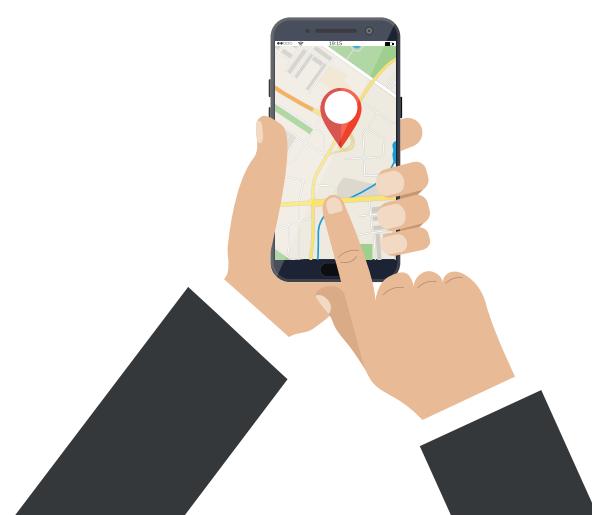
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GPS information when the app is not in use). Also, Whim stores all information about your trips, ranging from mode of transport to where you are travelling from and where you are travelling to, and what date and what time of day you are travelling. Whim uses this information not only to plan your next trip, but also to target advertisements based on your whereabouts. Most of us have been accustomed to targeted advertisements and location storage from using other apps such as Facebook and searching Google. However, how and where we travel have up to now been our own business.

Putting the privacy issues aside for a moment, services such as MaaS can be seen as positive from a sustainability perspective. There is a broad consensus that our current modes of mobility are unsustainable. According to the Norwegian Environmental Agency, the transport sector is accountable for 14 percent of greenhouse gas emissions globally. In Norway, the numbers are significantly higher. The transport sector is the largest emission source nationally, accountable for over 30 percent of greenhouse gas emissions. Road transport, with carbon based private car use as the spearhead, is mostly to blame. One way

to reduce emission levels from the mobility sector is to decentralize our system, thus reducing automobility and relying more on other modes of transport, such as biking, public transport and car sharing. Apps such as Whim who combine several modes of transport, planning our trips for us can make it easier to leave the car at home when we are going somewhere. But is what we have to give up worth it? In Norway, local companies are in charge of the public transport, owned by the local authority. In Oslo, Ruter, who I suppose most people in Oslo and Akershus are familiar with, are in charge of public transport. One solution could be to give them responsibility for other modes of transportation as well, such as the city bikes.

Are we located at a crossroad, where we have to choose between a sustainable transport sector and our privacy? Does a decentralized mobility system necessarily imply giving up our freedom to move anonymous? It is too early to tell. While our policymakers discuss who should be in charge of our future travels, MaaS continue to grow. Who gets hold of our mobility data in the future is too early to say, but the decisions are being made now.





Jelmer Kingma

## A matter of control

It is sunny outside, Lena is heading to the beach with some friends in her self-driving car. She only has to say the address to the dashboard computer and the car does the rest. On their way to the beach they play a game of cards, not paying any attention to the traffic around them at all.

Koen is crossing the street and is paying more attention to his phone than to the traffic around him. Lena's self-driving car is approaching him at a high speed and collision seems unavoidable. Surprisingly, Koen is not harmed in this situation. The autonomous car spotted him several meters down the road. The safest solution to the situation was calculated by the car within a microsecond and could therefore easily come to a halt, avoiding danger. The scenario with Lena and Koen is just one of many that could be seen in a future where autonomous vehicles are used. It all depends, however, in what form we will see this technology in the future and what pathways we have chosen for the implementation of self-driving cars.

The goal for self-driving cars is to run on a complicated system of cameras, software and sensors. The machine scans its complete surroundings multiple times every second and is always aware of the location of other cars due to a connectivity cloud. Based on the

maps constructed by technology in the self-driving car and the connectivity network, in combination with complex algorithms and carefully calculated protocols, the car can drive in public. Currently, the technological capability allows for semi-autonomous cars, meaning the chauffeur still pays attention to the road at all times, and takes over the wheel when needed. Should we give such a technology with the capacity to harm humans the authority to make its own decisions in public? However, one could also ask: should we give inconsistent, careless and disinterested humans that same control over automobiles in traffic? Currently the answer to the latter is 'yes', humans chauffeurs are in control over driving their cars. This fact results in 95% of traffic accidents being caused by human errors. This rate is expected to reduce to almost zero when self-driving cars are implemented in traffic and it could save many lives.

There are four predicted future scenarios and possibilities of self-driving cars analysed by the Dutch Knowledge Institute for Mobility. The first scenario, called "mobility as a service: any time, any place", is based on public transport. Self-driving busses can be easily ordered via a smartphone application and show up anytime and anywhere you want it to be. Users of this service would just have to pay



for the time they used the service, and that's it. Less people will own a car since self-driving busses offer the same benefits and take away the disadvantages. The drawbacks of owning a car such as the cost for car maintenance, paying your monthly insurance fee or the need to always find a parking space will be eliminated.

Another scenario is the "fully automated private luxury" option. If you don't have to drive anymore, everybody in the car has the freedom to do whatever they want during the journey. People's cars are their own luxurious palaces which can serve them in every need. Therefore, making it highly appealing to own your own car, since it literally offers limitless opportunities for its inner design. Private car ownership is highly valued in society.

In the "Letting go on highways" scenario people still have to drive manually in busy cities because the infrastructure and self-driving car technology is not advanced enough yet. Furthermore, people are not ready yet to fully let go of driving control. However, only on the highways, they do lift their hands off the steering wheel and let the car take over. They trust the self-driving technology because it's easier for an automated vehicle to maneuver on a highway than in a busy city. Owning a car is also still highly valued in society.

Finally, the "Multimodal and shared automation" scenario has the same level of trust towards the automated vehicle and technological advancement as the "letting go on highways" option. Only, instead of owning a car, the sharing of one vehicle with multiple people has become the new value in society. People can divide all car related costs, and with the help of smart cloud scheduling software, can still use the car whenever they want.

All the scenarios mentioned above will make traffic much safer than the current situation on our roads. The "fully automated private luxury", however, will be the safest since all traffic will be self-driving. Combining this with the new option to create your own pleasure palace inside your car make it sound even better. An almost 100% safe traffic situation where every car is completely customized to the needs of each individual in which one can do whatever he wants. Doesn't that sound great? Unfortunately, before this can be realized, we need to be ready to outsource driving control to a cold and heartless machine. Currently we have not reached this point yet, but I think eventually the pros of self-driving cars will overcome the cons.



Joar Kvamsås

## Travelling the Internet Map

Mapping the Internet is an unforgiving task. While many attempts exist to map out the complex interconnections of information that makes out the Internet, most of these result in a mishmash of overlapping links in various colours. They give an idea of complexity, but offer little in the way of actually navigating that complexity – essentially, they aren't very good as maps.

My favourite visualisation of the Internet is Russian data scientist Ruslan Enikeev's The Internet Map ([www.internet-map.net](http://www.internet-map.net)) from 2012. In this interactive network graph, a set of 350 000 websites are represented as dots, where the sites popularity is given by a dot's size, and the nation where it is most used is represented by its colour. You can either search for a given website or browse the entire map by scrolling and zooming across its various continents. Just like with a geographical map you can get lost tracing its paths, borders and intersections, going country-by-country or website-by-website.

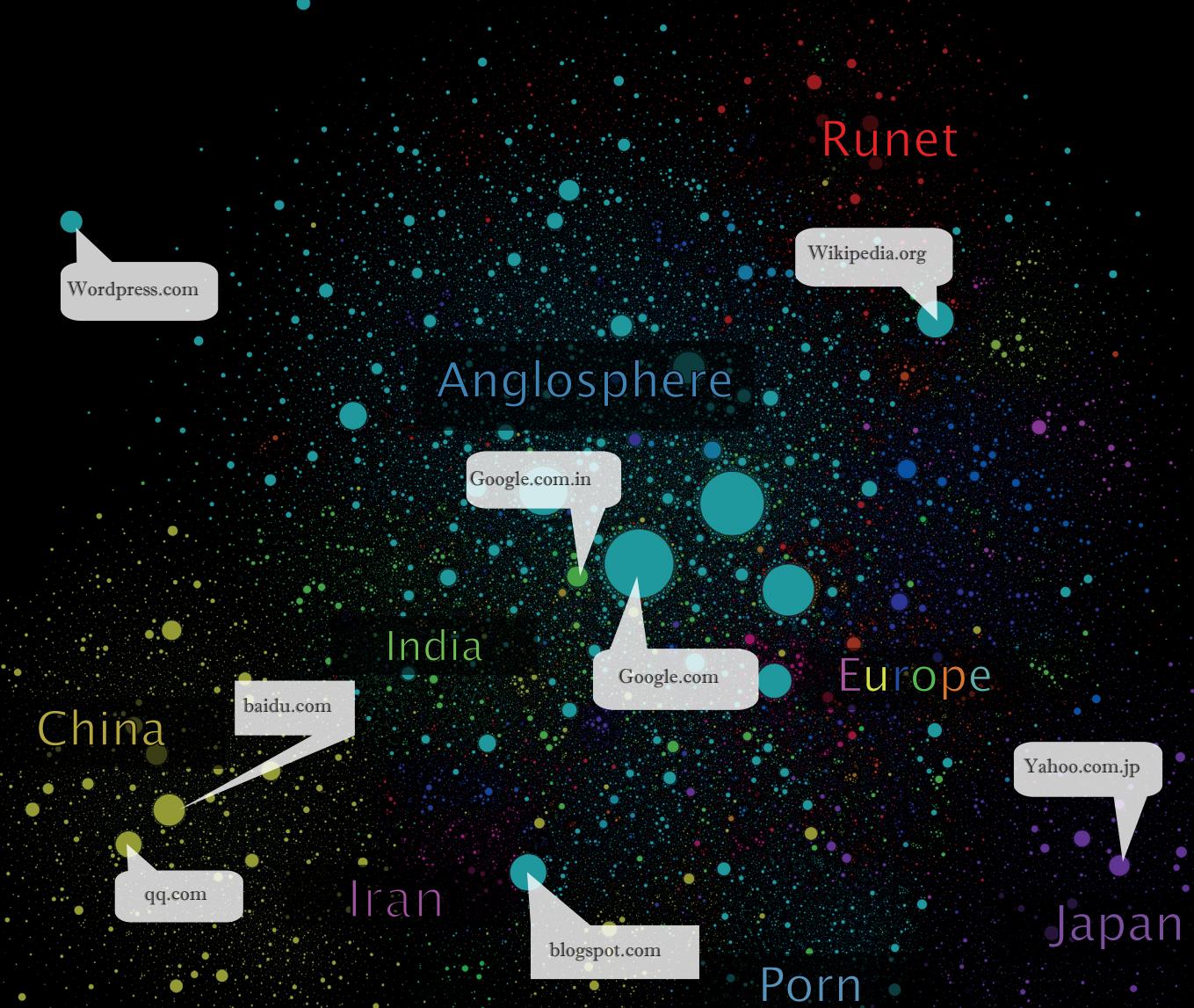
The first thing you notice when looking at the Internet Map are the major coloured continents. In the centre you find the Anglosphere, a vast continent that takes up a good third of the map itself. It is closely flanked by a rainbow-mix of European websites to the East, while a green India partially overlaps it in the West. Three major continents are isolated from it, existing in

spheres of their own: China in yellow in the South-West; purple Japan in the South-East; and the Runet, the Russian language internet, in the North, appropriately coloured red. Smack down in the centre of the map you will see google.com, next to other giants such as Yahoo, Facebook and YouTube.

The centre of most national clusters can be found by looking up the nation-specific google site; for example, the UK, Australian and Nigerian clusters can be located inside the Anglosphere by looking up google.co.uk, google.com.au, or google.com.ng respectively. This is not true for all, however. The Chinese cluster is dominated by the search engines Baidu and qq.com; in the Runet, google is superseded by both the search engine Yandex and the social media site vkontakte; and in Japan, yahoo.com.jp still rules supreme.

Looking at the distributions of the internet clusters can often be an enlightening experience. If you look at the Runet cluster, for example, you will find Belarusian sites clustered in the centre of the Russophone continent, between vkontakte and Yandex.

Ukraine is also central in the Runet, though a bit closer to the western site google.ru, while Azerbaijan can be found at the margin of the continent, surrounded by major Russian money transfer sites. Interestingly, certain web services have been



adopted by national clusters – livejournal.com can be found on the outskirts of the Runet, with Russians as the most important user base. Blogspot.com is surrounded by a massive cluster of Iranian blogging sites; blogging became an important news source in the country after a state crack-down on official media outlets in the early 2000's.

Meanwhile, the Scandinavian countries all cluster around Wikipedia, together with Poland, Germany and the Netherlands, the popularity of the platform probably due its combination of English and native language content in these largely bilingual countries. Youtube.com is closely flanked by a series of Greek news sites, a testament to Greek online news media's affinity for the platform.

In the South of the map, you can find a large Anglophone peninsula about the size of the Runet shooting off from the rest of the Anglosphere. This is the pornography continent, surrounded and overlapping with European, South-American and Asian sites of all colours. It is also the only part of the Anglosphere that borders directly with Japan, the border itself populated by a series of Japanese and American porn sites. Meanwhile, the pornography peninsula is separated from the mainstream Anglosphere by a series of video streaming sites of questionable legal status. Border areas can be interesting objects of investigation in their own right - the Runet, for example, is

separated from the Anglosphere by a series of English language dictionaries and translation sites. Oftentimes border areas are populated by web hosting services that span several national markets.

In the North-western corner of the map, two major websites are floating freely in the void, in splendid isolation from the rest of the Internet. The larger of the two is wordpress.com, a major provider of website design and management services. The other is Go.com, Disney's official web portal, where children can go to play games and find other Disney-related entertainment. What the two sites have in common is that they are both usually accessed directly and in isolation, as opposed to in a surfing session across several sites.

The true value of Ruslan's Internet Map is that it allows us to explore and discover. Whether we want to look at the particular position and connection of a certain site, or if we are looking to see how different countries and languages interact in cyberspace, a well-designed map such as this can be an invaluable resource to internet ethnographers and big data scientists alike when doing exploratory research. Like when perusing a geographical world map, it lets us discover connections and details that changes our view of the world in an instant. And if nothing else, it certainly is a good way to waste an afternoon.



Hannah Monsrud Sandvik

# What we do when we do things with words

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*"When I use a word,"  
Humpty Dumpty said, in  
a rather scornful tone, "it  
means just what I choose it  
to mean, neither more nor  
less."*

*"The question is,"  
said Alice, "whether  
you can make words  
mean so many diffe-  
rent things."*

*"The question is,' said  
Humpty Dumpty,  
'which is to be master  
– that's all."*

- Lewis Carroll,  
Through the Looking  
Glass and What Alice  
Found There

A foundational insight STS departs from is that concepts are not innocent. The words, theories and categories we use to describe and organize objects, events and people are, in addition to being tools for communication and science, also affecting the world. Think, for example, of gender and borders. Think also of economics, or laws. Here we have the case of societal infrastructures that started to exist as the result of how some people started organizing sexuality and identity, territory and trade, composing new concepts and discourses to go along with them. The point is that concepts structure how we perceive and understand reality. Words are, in a word, performative.

This is important for STS because it shows that while science and technologies explain reality by investigating phenomena and systematizing our knowledge of the world, it also in a certain sense constructs the world by doing so. STSers have used this argument to show that science is not a linear process where knowledge is accumulated by confronting the world through a systematic method. Scientists also bring something to the table, and this something is theories, presuppositions, interests and ontologically loaded language.

If language is filled with underlying assumptions about the world, then language itself should be closely examined. How do the words we use come into being?

For a word to be meaningful in conversation, it needs to be used by a significant amount of people over a longer period of time. It also needs to be taken to mean the same thing by the group of people using it. An example is Gretchen in the movie Mean Girls, who tries, futilely, to introduce the term “fetch” to describe things or states of affairs that are “very cool”. As long as she is the only one using it, it’s never going to have any conversational authority and people will probably respond with confusion and ask her what she means.

The point is that words gain meaning through the way they are used. While this may sound blatantly obvious, it sent shock waves through the philosophical scene when Austrian philosopher Ludwig Wittgenstein wrote about it in the 1950s. For Wittgenstein, there is no separate logic to the world independently of observation, rather, the world we see is defined and given a meaning through the words we use. A concept doesn’t designate something that is already given – it tries to articulate and systematize certain aspects of the world.

Words, then, have the power to shape how a certain issue is understood, and even to make something into an issue in the first place. One place where this comes to fore

is in politics. The very purpose of political speech is to shape how people see the world and steer development towards a desired direction. To achieve this, politicians often create concepts to coin and describe new policy approaches. Examples that should be familiar are “responsible innovation”, “green growth”, and “sustainable development”. Such politically vogue words are often referred to as buzzwords. They are used by science policy makers, by scientists in their research proposals, by journalists and by academics. They convey a set of values: the importance of relations between science and the public, responsibility for the environment and avoiding risks, for example. How do these words function, and how do they shape the issues they address?

We can approach this question by considering an example: Responsible Research and Innovation (RRI) is a concept that has taken a hold in science policy and governance over the past years. Generally put, the term describes research and innovation that is ethically acceptable and socially desirable. RRI is a politicization of the effort to make science more ethical and responsible. Among other things, this means that in grant applications, researchers will have to include a section that explains how their research engage with the

wider public sphere and discuss potential impacts on society and the environment. But what kind of concept is RRI? It is just filled with empty buzz, or can it be a useful tool for reforming modern science policy?

Buzzwords are often dismissed on account of being empty and misleading, but this doesn't mean that they can't be powerful. In her article "The politics of buzzwords at the interface of technoscience, market and society", Bensaude Vincent demonstrates how buzzwords shape the technoscientific landscape. The power of these words lies in the fact that they urge towards a desirable future, creating expectations that mobilise the future into the present. RRI is an example of this: by establishing a moral basis for science, innovation can be controlled in order to secure the right kind of impact.

What exactly is meant by the term is hard to pin down, however. There are a variety of definitions of RRI, each putting emphasis on different aspects of the general idea. This is a characteristic of buzzwords: they are fuzzy enough to contain a variety of meanings and are often difficult to use as roadmaps. While they successfully point to a matter of concern, they often fail to suggest how we should deal with it.

The fuzziness of buzzwords can make it easy to conceal conflicts between opposing values. Think, for example, of "sustainable development". Here, the idea of sustainability is put together with the idea of economic growth. The notions of change and permanence put together seems to imply a contradiction, but, as Bensaude Vincent point out, the performativity of the concept rests on this inconsistency. The promise of the concept is that the conflict between two opposing values can be overcome, but how, exactly?

All of this goes to show that the concepts we use are inherently political and ideological and that we should approach and use them with care and analytical consideration. For STSers, this means that we should pay attention to their context of emergence and investigate the epistemic and societal values that goes into creating them. Understanding how a concept comes into being and what forces determines how it's understood, we can critically engage with its content, and perhaps be a force on our own in the creation of better wor(l)ds.



Katie Coughlin

## Universal Basic Income: Into the age of abundance?

Google executive and AI futurist Ray Kurzweil predicted at the 2018 TED conference that "In the early 2030s, we'll have universal basic income in the developed world, and worldwide by the end of the 2030s. You'll be able to live very well on that."

Universal Basic Income (UBI) is defined as a regular and unconditional payment to every citizen of a country, regardless of other income. With supporters such as Richard Branson, Elon Musk and Mark Zuckerberg, UBI is gaining interest for its potential to counter the negative economic effects of job displacement and income disparity from workplace automation.

Current studies predict that anywhere from 20-40% of jobs will be lost to automation. Economist John Maynard Keynes termed this displacement technological unemployment already in 1930. Further troubling is the unclear outlook for job creation. What do we do when, by an unreachable margin, there are not enough jobs to go around? What would this do to today's already growing income disparity?

Kurzweil believes that UBI would offer a safety net and flexibility that could optimize the labour force, give better working conditions, reduce inequalities and end extreme financial poverty. He envisions an "age of abundance" where workers could opt to

reduce their working hours and devote more time to other interests without sacrificing their basic income.

The concept of UBI is not new and the idea can be traced back to the early 16th century in Thomas More's Utopia (1516) and Johannes Ludovicus Vives' On assistance to the poor (1526). In his 1930 essay Economic Possibilities for Our Grandchildren, Keynes envisioned 100 years into the future that we would reach an age of leisure, a "destination of economic bliss", in which we would have most of our material needs met and could enjoy 3-hour workdays and more leisure time. In the 2008 book, Revisiting Keynes, however, economists claim that Keynes failed to account for problems of income distribution and inequality. Perhaps UBI could be the instrument to smooth out income disparity and open the door for Keynes' predictions to be realized?

As of yet, there are no successful implementations of UBI, only speculation and fragmented trials around the world, such as in Finland, the Netherlands, Kenya and Scotland, with various solutions being tested among various population groups. Finland's trial was recently cut short after just one year with no published results. One economist I spoke with pointed out that only controlled random trials will give an accurate indication



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of effectiveness. Finnish participants, on the other hand, were drawn from a select pool of unemployed persons.

Variations of UBI could be geographic as in a rural basic income in which only rural area residents would receive a payment. Other suggestions include negative income tax schemes and basic capital grants.

A 2017 European Social Survey (ESS) found wide support for UBI across Europe, particularly with youth. With so much interest, one may wonder who opposes the idea. Some worry that UBI would lessen the motivation to work. Surprisingly, the country with the lowest support for Universal Basic Income in the ESS study was... can you guess? Norway! This may be due to the already high level of public support available.

Kurzweil contends that the primary concern under UBI would be to ensure life meaning

and purpose. Can the freedom of leisure also be destructive to society? Classic dystopian novels such as *Brave New World*, *Anthem* and *Fahrenheit 451* give imagined glimpses of post-technology states where authoritarian governments have taken control of populations, because individual freedom in a technology age caused too much disruption.

UBI and an age of abundance can sound too good to be true. What would you do if you had a guaranteed income for life? The question evokes interest but also thoughts of lottery winners who go bankrupt. Could we trust people to put guaranteed income to good use?

Predicting the future is anyone's guess, but for today's youth who are overwhelmed with messages of despair about their future, UBI gives hope.



Helge Helguson Neumann

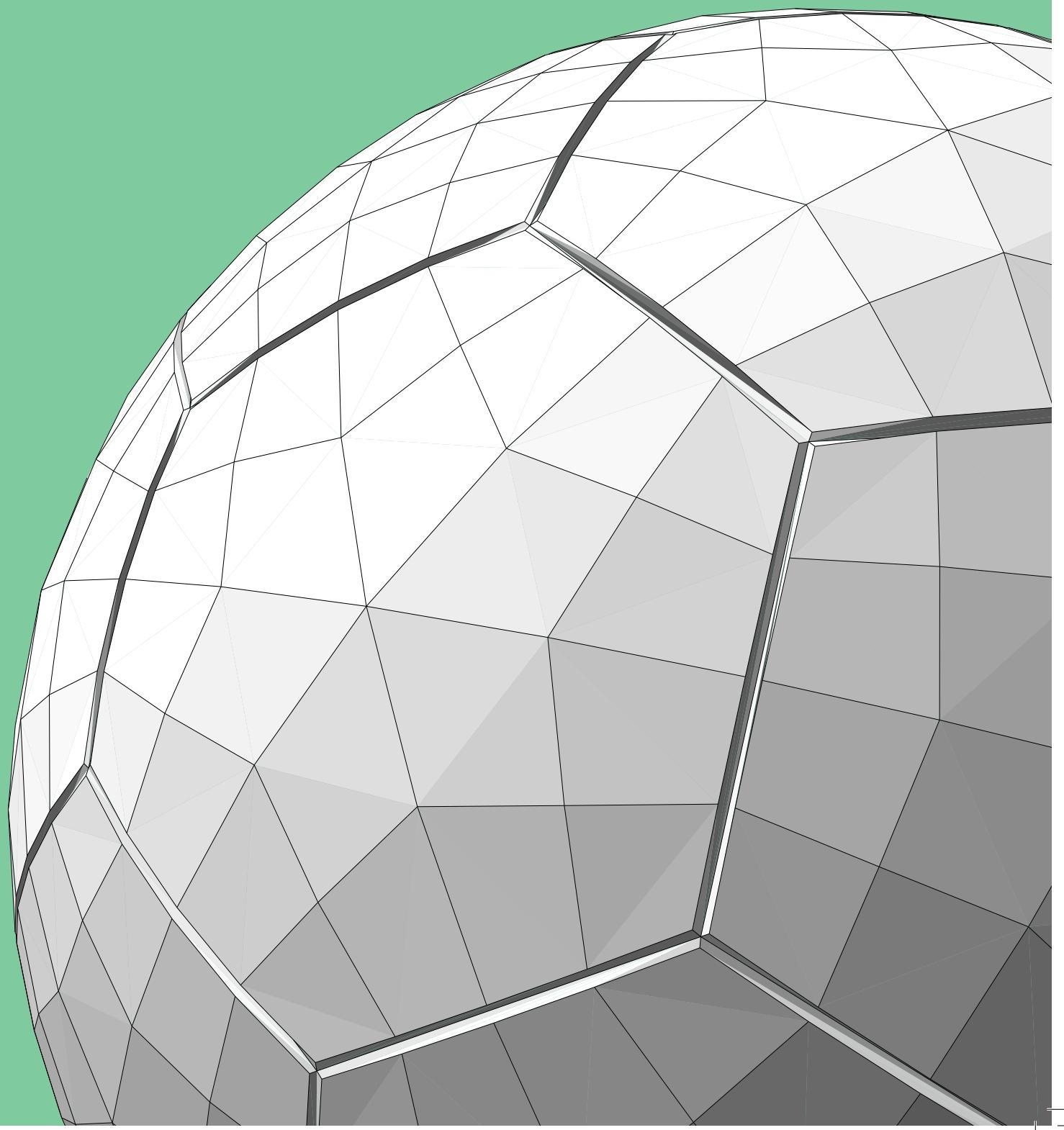
## Get ready for the VARld Cup!

*Technologies and innovations spur out from a need or a problem. In football, one such problem has been the game-deciding human errors of the referees. New and available technology could resolve this problem and make the game more just. So why is it so difficult to embrace for the fans, coaches, and players?*

What is football about? Ask any fan and they'll tell you about the glorious victories, the bitter defeats, the passion of the supporters. What they are really saying is that football is all about emotions. The players are referred to as artists, even Gods, creating what is known as "the beautiful game". We think of the magnificent goals, the ingenious pass, and the outstanding tackle. But just as often, it is a game of mistakes. The goalkeeper who fumbled the ball, the defender who scored an own goal, or the striker who missed the open goal. Even the referee, the representative of justice and fairness on the field, occasionally make mistakes, calling a wrong penalty that decides the outcome of the match and causing an uproar by disappointed supporters. There is nothing more painful and upsetting for the fans than having the "ref" decide the outcome of the game. Now, recent technological advances have made it possible to reduce these human errors, but at what cost for the art of the sport?

Like the rest of society, the age of digitalization has hit football. Within the last couple of years, fans have been introduced to goal-line technology (to settle whether the ball was really over the line), big data statistics (to see whether the players are actually playing well) and video-assisted refereeing, or VAR, as it is abbreviated. VAR gives the referee, or an assistant, the opportunity to look at replays to make critical decisions during a game and is already being introduced in several leagues and tournaments around the world. The intention behind it is naturally to make the game fairer, and the policy-makers has the statistics to back it up. In all three major leagues which has introduced VAR, the MLS (USA), Bundesliga (Germany), and Serie A (Italy), the result has been more correct decisions and less fouls as players know they are being watched. With these promising results, the international football confederation decided in March this year to introduce VAR in the upcoming 2018 World Cup in Russia. One month later the biggest VAR-scandal so far happened.

The scandal takes place at Opel Arena, where the home team Mainz welcomes opponents Freiburg. Both teams are struggling to avoid relegations and with a victory Mainz can move ahead of Freiburg on the table and out of the relegation zone. After 45 minutes of play, a shot hits Freiburg defender Marc-



Oliver Kempf in the arm. The Mainz players are screaming for a penalty, their fans even more. Referee Guido Winkmann waves play on and soon after blows the whistle for half time. Then it happens. VAR has seen a foul. Six minutes into the half-time break, while fans are filling up on drinks and snacks, Winkmann bring the players back onto the pitch to award Mainz the penalty. Mainz score and eventually win the game. The Mainz players are relieved, their fans happy, the Freiburg fans are furious, but the footballing society is most of all confused. What the VAR happened?

Football and technology doesn't always go hand in hand, and there are two recurring problems with VAR which both touches upon the emotions of the fans. The first is the time it takes time to review all the decisions. As Juventus-coach Massimiliano Allegri put it: "It's turning into baseball. You see some action every quarter of an hour". And there is nothing more frightening for Europeans than having their "beautiful game" turning into an American sport. In Australia's A league it took four minutes for the referee to award a penalty. Fans are getting bored and they don't want to wait an extra six minutes into the half-time to see whether the referee will call a penalty. The spontaneity goes away when players and fans must wait a couple of minutes to see if they can celebrate a goal.

The other problem goes deeper. It touches upon the very nature of the sport, why fans are referring to it as "the beautiful game" and to the players as artists or magicians. After a controversial cup-game in England, former captain for Norwegian men's football team, Brede Hangeland, tweeted that "VAR will destroy football as we know it". Similarly, one of the most recognized goalkeepers of all time, Gianluigi Buffon worries it makes the game inhuman. The beauty lies in the potential mistakes. By adding chance into the game, anyone can win it. Football is supposed to be spontaneous, dramatic and emotional. It is not supposed to be flawless, and technology challenges this.

As with the rest of society, football will not be unaffected by technology. The game that the pioneers invented in the late 19th century looks miles away from what is being played today. In the end it all comes down to the integration of technology within the game. This summer, VAR will take on its biggest challenge during the World Cup. For one month, the event will gather over 3 billion viewers worldwide. A flawless championship might lead the footballing world to embrace VAR, but a scandal like that of the Bundesliga might set back the integration of VAR. And it doesn't matter whether the actual decisions are correct or not because the game is about emotions, not rationality.



Siv Helen Egelund Gjerstad

# Critical thoughts on critical thinking

*What does a porn star and a 13-hour teaching program have in common? They both have the potential of reducing the chance of Trump being re-elected as president.*

You may be disappointed, but it's the teaching program and not the porn star that is the star of this show. A Norwegian study has recently managed to show great potential in a teaching program on critical thinking for children. Reflection and understanding of the logical reasoning behind information is important for the choices we make. The trend of false information being widely spread through the internet, and episodes of world leaders openly downgrading scientific research, make these findings highly relevant. We know that humans in general tend to struggle with critical thinking tests, and that the lack of ability to evaluate information may have fatal consequences. This raises the question of how effectively we can learn critical thinking, and what we can do to reduce the impact of illogical reasoning and false information.

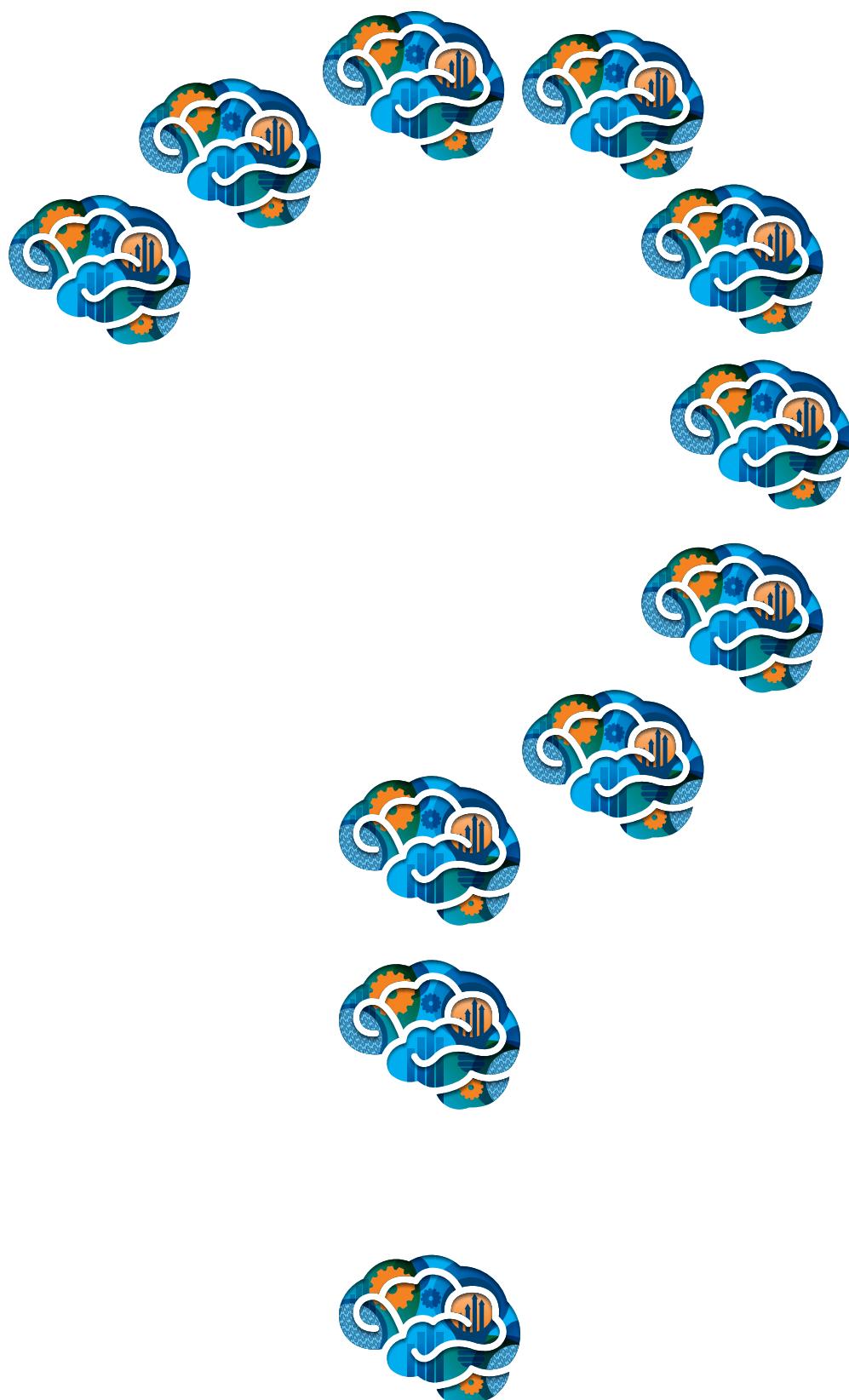
## Rejecting scientific knowledge

Donald Trump, the president of USA, has been the centre of the fake news debate with his ongoing accusations of his critics as messengers of fake news. Assertions like these, in combination with actual spreading of misleading information, have blurred the lines between fact and fabrication. We have also seen the Trump administration's tendency

to decline science and expert advice in favour of their own 'common sense' perceptions in several cases. The repudiation of climate change being may be the most startling. The American Centers for Disease Control and Prevention has also reported that the Trump administration prohibited them to use the words 'evidence-based' and 'science-based'. Without comparison in general, we have seen examples of both politicians and other actors in Norwegian public debates declining scientific research in favour of 'common sense' perceptions as a basis of arguments. The trend of undermining scientific facts is indeed alarming.

## Detecting false information

Truth versus false information is not an issue exclusive to political discourse. The ordinary citizen's troubles of steering clear of false information has become an even greater problem as the expanded use of the internet and social media has made spreading of information very easy. It is somewhat paradoxical that the broadened access to the internet that has provided people with nearly limitless access to all kinds of information is also an essential part of the false information problem. An article with false information may be published with the intention of misleading people for financial or political purposes, or simply for gaining click revenue and online sharing numbers. Further sharing by convinced readers will increase the reach



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even more, and may also contribute to the legitimization of the content. The problem seems also to be related to the increasing choice of channels available for receiving information, making it easy to seek out information consistent with the readers' own views, and disregard other sources.

Because the things we believe to be true have a great impact on the choices we make in our lives, the ability to make critical evaluations of information we are presented with is of great importance. Choices that influence our health and wellbeing are particularly critical in this regard. 'Facts' about our health are among those that are plentiful, especially online. Some health advice is practically harmless, like 'eating carrots makes your eyesight better', or 'face creams with e-vitamins reduce wrinkles'. Other health related claims presented as facts are riskier, like 'herbs can cure cancer' or 'STDs are not contagious if you shower after sex'. One of the more alarming health beliefs are those of anti-vaccination. In Norway we have seen smaller groups of vaccine opponents contributing to the periodic outbreaks of measles over the last decades. The same has happened in other countries, like Italy and Sweden. Measles are one of the most severe childhood diseases we know, and also one of the most contagious. And yet, there are widespread doubts as to the benefits of the vaccine.

The problem is initially that we struggle, not only to detect a claim made on false premises, but to make individual evaluations of lines of reasoning that are presented to us.

### **Teaching critical thinking**

In 2017 the Norwegian institute of public health (Folkehelseinstituttet) conducted a study on the topic of critical thinking

presented in two articles published in *The Lancet*. The study was a cluster-randomised controlled trial, including primary school children in Uganda aged between ten and twelve. The objective was to teach the children how to critically evaluate health related claims through a 13-hour teaching program conducted over three months. They found that in the schools where the children had been taking part in the program, almost 50 percent more of the children passed the critical thinking test compared to the control group. These are highly significant results with large effect size, showing a strong effect of the critical thinking programs.

### **Education to the rescue**

The results from the study illustrates how even young children can learn critical thinking, and that a relatively short teaching program can be very effective, even in schools with scarce resources and low density of teachers. The fact that teaching programs like this one can have an impact on the ability to make critical evaluations on health information, can suggest that it may also be the case for other types of information. Giving people tools to make independent and critical judgements on the facts they are presented with is important from both a health perspective and a broader political perspective. Discovering the learning mechanisms is an important step in the direction of fighting the impact false claims and fake news have on society.

We know the possible consequences of relying on false information, and thus the benefits of critical evaluation skills. With increased knowledge also on the ability to learn it from an early age, the choice of implementing it as a school subject should not be a very hard one.



Joar Kvamsås



Frans Joakim Titulaer

# The technology revolution betrayed

After Lenin's death in 1924, the Soviet leadership scrambled to keep together their young country, recently ravaged by civil war. As the Bolshevik elite strove to safeguard their revolution, they found themselves balancing two evils. First, there was the threat of factionalism, which Lenin had outlawed after the devastating Kronstadt rebellion of 1921. Secondly, the Bolsheviks feared Bonapartism: The historical precedent of a revolution being corrupted by a military strongman from within ranks of the newly formed government. As Marxists, the Bolsheviks believed in the cyclical nature of history, and opponents of Trotsky were particularly eager to compare him to Napoleon. After his subsequent exile, Trotsky would write in *The Revolution Betrayed* (1937) that it was in fact Stalin who had turned out to be the Bonapartist (the latter made sure to have Trotsky assassinated some three years later.)

Today's techno-revolutionaries share some notable parallels to the revolutionaries from a century ago: Both see technological change as the impetus for rebuilding the socio-political system. Blockchain technologies often seem oddly abstract and difficult to understand because much of its potential lies in social change. Its distributed characteristics are supposed to bring about decentralized control, detached from the rotten legal and

economic structures of conventional liberal democracies. Blockchain's most prominent application, cryptocurrencies, evade the slow grind of national and international legal systems, including (but not limited to) tax codes. Cryptocurrencies are smart contracts: Computer protocols intended to digitally facilitate, verify, and/or enforce the negotiation and performance of a contract. Smart contracts allow the performance of credible transactions without third parties. Like the communist movements of the early 20th century, these semi-organizations largely define themselves in opposition to the prevailing power constellations. Moreover, these forms of organization continue to be haunted by the fear of irrational dedication to the strongest actor in the new power structure.

Given these parallels, the droves of people currently putting their faith and their savings into cryptocurrencies would do well to take a leaf out of the Bolshevik playbook, and look at the pitfalls that befell previous techno-revolutions. The fledgling Blockchain revolution seems to bear many of the characteristics of the technological revolution we saw some twenty years ago: The dawn of the modern internet. For many, blockchain has come to represent what the Internet once was hoped to become; in fact, some observers go so far as to call it the real Internet. Like current blockchain technologies,



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the infrastructure of the 90's internet was supposed to be built and run by many small actors with a decentralised power structure, a democratising force that would foster free exchange of information as well as goods.

However, the dispersed structure of the early internet also made it hopelessly fractioned. Without good search engines, people surfed the web by going from site to site - these were the days when websites would often include a separate page dedicated to collections of links. As the technology matured, both trade and communication were consolidated by big platforms such as Amazon, Youtube and Facebook, while navigation was left to giants such as Google and Yahoo. This streamlined services, but also monopolised them and created unassailable empires. The Internet 2.0 became the Bonapartism of the Internet revolution.

The betrayal of the Bolshevik revolution did not arise from the animosity between Trotsky and Stalin, but was rather a reflection of the internal contradictions of the political technologies available to the Soviet leadership at the time. Soviet rule was founded on an idea of democratic centralism, in which the leaders of the revolutionary working class of Russia were all recruited from a major organization consisting primarily of workers under a democratic internal hierarchy. Like

under Napoleonic rule, the party hoped to ensure a technocratic form of representation by radically extending knowledge production through innovations in accounting systems and bookkeeping. Their claim to legitimacy however also came to depend upon the promises that had interested so many. Rather than withering away to give room for new social structures, the state became an oppressive monolith.

Likewise, there are certain internal contradictions to Blockchain technologies that mirror those of the early Internet. Just like Google and Facebook, cryptocurrencies are democratic in that these technologies can be created and used by anyone, but monolithic in that they depend on massive user bases to function. The euphoric belief in the unknown potential of a new technology fuelled the dot-com bubble of in 1990's, and is causing massive speculation in the cryptocurrency markets today. The profitability of web services in the 90's were vastly overestimated, and the lion's share of the net was gobbled up by a few actors who today wield powers of Orwellian proportions. The population of different cryptocurrencies increases by the day, and while most will soon enough be relegated to the dustbin of history, it remains to be seen if a new Bonapartes will emerge from among them, and what it will do to the Blockchain revolution.







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