

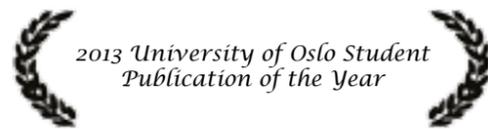
TEKNOVATØREN



CIVILIZATION

TEKNOVATØREN

Teknovatøren is a semi-scientific magazine published by the master students at TIK Centre for Technology, Innovation and Culture, University of Oslo. Teknovatøren seeks to illuminate issues on technological development, innovation and knowledge production.



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CONTRIBUTORS

Layout: Anine Havn Andresen
 Photography and artwork: Shutterstock (unless otherwise noted), Freepik

EDITORS

Kim André Hansen, Lisa Mehre Ystgaard, Magnus Jacobsen and Henriette B. Johannessen. We thank Harald Smedal Stamsø and Kristoffer Lorentsen for their assistance.

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Magnus Jacobsen
Executive editor
magnujac@gmail.com

EDITORIAL

This issue of Teknovatøren has chosen as its point of departure, the fantastically broad term *civilization*. In relation to the previous issue where we looked to the future based on current trends and developments, this issue has taken a different approach, centering on historical developments in the hope of understanding what we have come to associate with a civilization. We could not have hoped to achieve this without touching upon some of the traditional themes of this publication, and as such, we are proudly writing ourselves into a civilization of previous issues of Teknovatøren, to which we owe great debt. For what is a civilization if not an entity of which its members is working together in community, not always with one single common interest, but always with the common interest of progress as its driving force?

Every civilization has its challenges and battles to overcome. Present inhabitants of planet earth will perhaps have noticed the challenges of dealing with the climatic problems we humans have created. These issues highlight the global nature of modern civilization: technologies are bringing previously distant inhabitants together in dealing with common problems. As with our technologies, civilization is continually expanding its boundaries, even to the far away corners of our galaxy. Technology, as such, sets the limit for civilization's extent. It allows us not only to move through time and space, but also to access our own creations in making new worlds and communities online. Our technological artefacts are increasingly integral parts of our daily lives, a fact that may cause many different reactions. It might even challenge our own conception of ourselves as human beings, and question the values with which we associate ourselves, and with our surroundings.

Privacy, efficiency, sustainability, history, energy, government, infrastructure and inhabitants: these are but a selected few of the core elements of any discussion on a civilization, upon which we measure technological development. Civilization is a mean for survival, a defense mechanism against both internal and external threats. As such, civilizations are always struggling to survive, legitimizing their existence through its technologies of governing technologies, science and citizens. If we move too close to the sun we might get burned, but if we stay grounded for too long we might be drowned by the rising sea. The power of monitoring and controlling technological development is as challenging as it is essential for the existence of civilization, as we know it.

Choosing a term like civilization as the topic for an interdisciplinary semi-scientific exploration of human (and non-human) technological construction is not the easiest task in the world. We could of course have taken an easier route, limiting ourselves to one specific civilization, the present state of our increasingly global civilization, or making a fictitious civilization out of current technological developments. We did neither of these things. We could even have limited ourselves to the human race. We did not. Instead we chose the difficult route, where the ins and outs, the past, present, and the possible future of this, our strange corner of humanly measured eternity, is depicted through the technologies that enable us to discuss this very term; civilization.

This is our civilization, and in drawing its boundaries we have attempted to show the diverse, yet strangely connected elements of which it is made. From the earliest stages of technological development to the possibilities of interplanetary expansion, and some of the lines in between, we have mapped out our territory. Now we invite you to take a journey through it, using one of the oldest technologies we have: writing. Welcome to the civilization Teknovatøren!



Martin Gulseth
TIK MA student

“Whereas categories come and go with history, culture and context, the notion of civilized and uncivilized people is still going strong in our civilization.”

THE PLAY OF CIVILIZATION

It began like a miracle, developed like a dream and continued like an adventure. The play of civilization is a never-ending story of human development. Even though we question the most desired fairy-tale ending of the play.

A closer look at the different definitions on the term *civilization* reveals a great number of possible interpretations. I will not leave you with a clear explanation, but with some very important common components to the concept. The term civilization is often linked to a large group of people, people with a common advanced culture. The latter point emphasizes perhaps the most important feature of the word: an advanced culture, a complex society and a focus on the value, creation and implementation of new technologies. Let us first explore some classical conceptions of the term.

From an early age, we learn about the first great civilizations and cities such as Athens in Greece, Rome in Italy and Babylon in Mesopotamia. We learned how people developed their culture and how they lived their lives. There have been huge developments from the first known civilizations to

the present ones. If you take a closer look at where we are today, you will see cities that are so large in both population and size that we are having trouble keeping them afloat. Take for example the challenges with water and energy supply. The cities we now live in were not originally built for the number of people currently inhabiting them, and some of the power systems are in fact not capable of delivering a sufficient amount of energy. However, this is not a new problem. Over the years, humans have had to overcome all kinds of big challenges. Take for example the implementation of the infrastructure for the automobile. The roads we now use were first built for humans and horses. Still, in the already settled cities, we managed to build new roads designed for a new type of transport system. This notion of problem solving and the human ability to create is a part of the history of civilizations.

Civilized or uncivilized

In our daily language we often talk of people either as civilized or uncivilized. To call a person or a group of people uncivilized is normally characterized as a degrading statement. It signifies that the person is not a part of a civilized group, lack cultural capital and abilities. These abilities could be anything that a given group of people relates to being civilized. In some factions, these abilities may relate to academic results while in others it may relate to appearance and personality. To be civilized gives you these qualifications that uncivilized people lack. Antonyms for civilized and uncivilized could be modern and primitive, and may serve the same notion. In a traditional use of the two contraries, we often distinguish people living in the city from people living in the periphery. However, it can also be used to distinguish different groups of people living in the same geographical area that are different

when it comes to culture, religion, language and so on. This separation generates some kind of categorical thinking, which is very normal for human beings, but may also be one of the longest existing forms of pigeon-hole mentality. This is a stereotypical way of thinking which contributes to the creation of categories of prejudices. Whereas categories come and go with history, culture and context, the notion of civilized and uncivilized people is still going strong in our civilization.

Technology versus nature

Whereas uncivilized people in the periphery live *for* nature, civilized people in the cities live *from* nature. This is an often-used sentence in a time of huge climatic challenges. People in close contact with nature are often presented in debates as examples to be followed. To eat more organic food and promote organic farming, use less energy and promote renewable sources of energy and so on. But there are other solutions to these

challenges. The Norwegian Minister of Environment wrote in the newspaper Dagens Næringsliv on February 26th that the development of new technologies is a central aspect of the Norwegian government's policy. Is this contrary to the easy, close to nature-living lifestyle? We have had huge challenges in the past, but our ability to create and work as a highly qualified civilization has always helped us solve problems. Therefore, in a sense, technology and nature can be two sides of the same coin: civilization. However, will civilization help us this time? Will new technologies and sharp minds resolve our huge climate challenge? A term that is very common in our field of study here at TIK, and which has given name to a previous issue of this magazine, might shed some light on how we may view civilization in the following years, and with that perhaps also the climate challenges. The term I am referring to is "creative destruction", made famous by Joseph Schumpeter.

Creative destruction

The expression derives from an economic thought where innovative technological progress destroys old and worn out methods and replaces them with new ones. All this is related to the field of economics, another core component of civilization. In addition to the economic side of the expression, you find a belief in innovation as an answer to challenges. Innovation can explain a whole lot of the term civilization. Whereas I used phrases like technological abilities and human progress, innovation may link this together. In other words, creative destruction could be an expression that simplifies the words of the Norwegian minister: an innovative belief in new solutions for development. I mentioned the challenges regarding the climate as a case where this notion of thought could be used, but it can also be linked to a number of societal challenges we face now and in the future. In this sense, creative destruction is a positive term. As President Barack Obama stated in his

presidential campaign: "Yes, we can!" In a more subjective and philosophical sense, the expression could be interpreted a bit differently. When I first heard the words creative destruction, I linked it to the destruction of humankind itself. We have creative minds but not creative enough to take in how dangerous human inventions can turn out to be. The nuclear bomb is a classic example of this.

Just destruction

The aim of this text is not to predict a coming Doomsday. Still I was struck by a quote from the famous inventor and innovator Nikola Tesla: "The spread of civilisation may be likened to a fire; first, a feeble spark, next a flickering flame, then a mighty blaze, ever increasing in speed and power." This quote incorporates the history, the technology, the innovation and the volume aspect of the term civilization. Still, in a clever way, it leaves us without an answer to what will happen in the future. In a way, it pro-

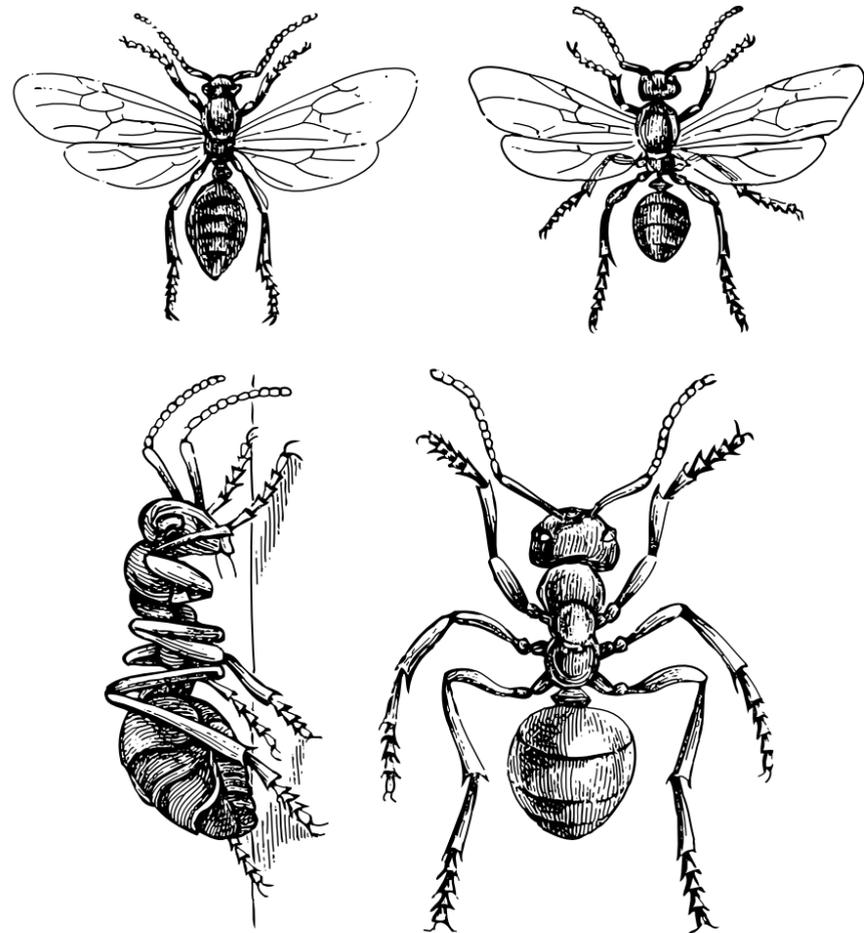
vokes one of the great philosophical questions in human history: what will happen after us? The core of all this is of course civilization. It is what has shaped and developed the modern world and will perhaps also be there at the end, in one way or another. Is this civilization sound? Is it the beacon of human existence? Alternatively, is it destroying us from within? Like a destructive destruction.

Epilogue to prologue

The terms epilogue and prologue are taken from the classical Greek theatre. The prologue is placed at the beginning of the play and the epilogue at the end. A common way of stitching a play together is that the end brings us back to the start. It is a dramaturgical way of making a clear thread through the whole play. I feel this metaphor applies for the term civilization as well as with what has been discussed in this text. There have been huge obstacles along the path of development throughout

history, but each obstacle has been worked out with the knowledge and abilities available at the time. It is a never-ending story of development. Just to be clear, there is no need for an obstacle. It could also be that the human lust for improvement is creating these plays of civilization. Therefore, when we in case of an obstacle, or of pure lust, develop civilization and end it with an epilogue, we always turn back to a new, and in many cases, improved prologue. The question that many people have asked themselves throughout history - that is just as valid today - is: when will we see the final and concluding epilogue of the play of civilization?

"The spread of civilisation may be likened to a fire; first, a feeble spark, next a flickering flame, then a mighty blaze, ever increasing in speed and power."
- Nikola Tesla



ANTHROPOLOGY

Do you ever look at people from afar and think: “Wow, they look like tiny ants”? It is rather a common metaphor, yet it raises an interesting philosophical question: If you look at ants really, really close up, will they look like tiny people? In this short article we will take a brief look at the lives of these tiny insects and see how their societies match up against our own.

The pinnacle of human society is just that – our society. Through organizing and structuring, we somehow manage to orchestrate the grinding gears of our community – a community in which we all have different and complementary roles to fill. Yet, this division of labor is not unique to the human race, as ants and other eusocial species of animals clearly illustrate. For instance, while ants may not have lawyers, economists or accountants (okay, maybe), most of the 12.000 known species of ants divide their members into different classes or castes: queen, workers, soldiers and drones. The queen is responsible for laying eggs, whereas workers take care of these, the mound, and forage for food. Soldiers, on the other hand, protect the hive from external threats, while the drones, which are the only male ants in a colony, only exist to fertilize the eggs. (Talk about equal rights!) Yet, despite this clear separation of castes, ant colonies do not exhibit a hierarchy of governance unlike most human societies. As far as we know, there is no democracy for ants, no power-hungry queen or Illuminati reigning from behind the curtains. Instead, ants are intrinsically motivated by the survival of their colony, and thus live in a sort of highly organized anarchy. However, whether or not they have protests or riots is still unknown.

Another feature of ant colonies: humans are not the only earthly inhabitants engaged with agriculture. Some species of ants, such as the African *Melissotarsus*, know how to benefit from the domestication of other types of insects. In a few instances this practice produces a symbiotic and mutually beneficial relationship, yet most of the time it is not, with clipping of wings and chemical retardation of growth being common

practices to prevent the “cattle” from escaping. The extrapolation of this to human practices seems unnecessary.

As these practices demonstrate, the ant mound seems highly adaptive, and just like our thinking apparatuses (a.k.a. our brains) the mound is comparable to a problem-solving computer reacting to different threats and

When you see a lone ant stumble onto your picnic blanket in search of food, it is easy to assume that it is zigzagging around at random, yet this could hardly be further from the truth.

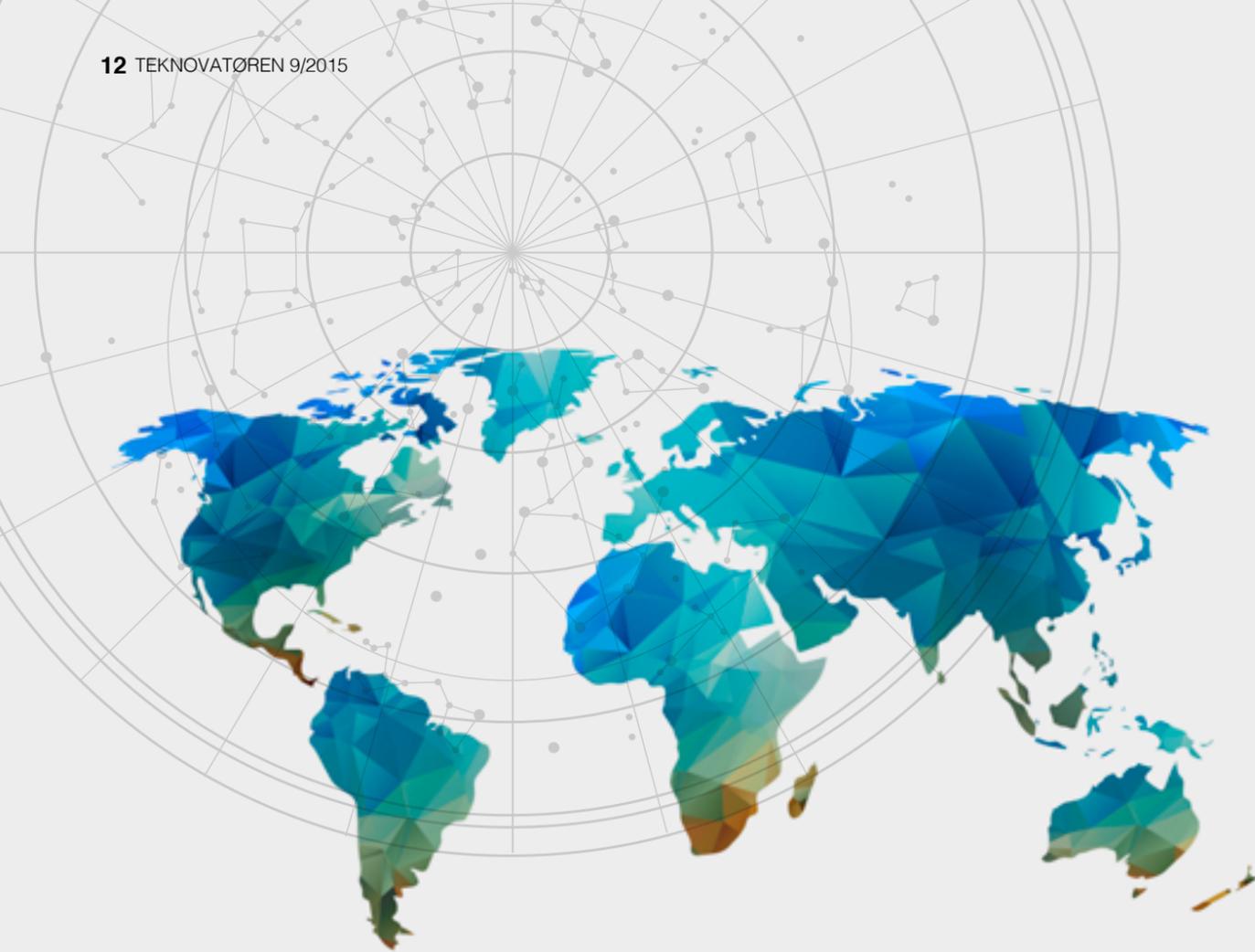
challenges. When you see a lone ant stumble onto your picnic blanket in search of food, it is easy to assume that it is zigzagging around at random, yet this could hardly be further from the truth. ACO, or Ant Colony Optimization, is a set of computer heuristics meant to mimic the problem solving skills of ant colonies, and it is currently being applied to a range of human challenges. For instance, although ants may not pave tiny highways (after all, they do not have cars) or install signaling systems to prevent traffic jams, their pheromone-based “traffic

system” is indeed very sophisticated and efficient. So efficient, in fact, that some freight companies in the United States are using ACO-heuristics to optimize their delivery routes between cities, and with good results. Considering the ever-growing number of humans on our planet and the increasing demands that this is putting on infrastructure and efficiency, the workings of these tiny buggers is actually quite significant. Another field of research, although still in its infancy, intends to use “virtual space ants” to calculate the most efficient route for traversing our solar system. Although this may sound far-fetched, the idea of using the gravitational forces of celestial bodies to slingshot the spacecraft forward and thus minimizing fuel consumption, definitely is not. Just ask the crew of Apollo 13.

Although scientists have found ants to fare relatively well in zero-G, ultimately it is us humans who will pilot the space ships to mars. Yet, in a broader sense, looking to nature for inspiration and solutions to our current problems and challenges may not be such a bad idea after all. Did Henry Ford have ants in his pants when he implemented the conveyor belt and revolutionized the automobile industry? Perhaps. Regardless, no matter how clever we humans may be, with our megacities and modern societies, Mother Nature and her creatures are not all that stupid either. Perhaps this is where we should look for answers?



Kim André Hansen
rullekim@gmail.com
TIK MA student



DRAWING BOUNDARIES

Anyone familiar with computer strategy games will know that a good start is a good overview of the surroundings. The goal of most games is to build a civilization, and it is crucial to control resources and information. When your civilization develops and its boundaries expand, the questions soon arise: What else is out there? Without knowledge and technology to define and understand our surroundings, the world is a dark and mysterious place.

Exploration and traveling has provided humankind with more information and greatly expanded our worldview. The knowledge of, for instance, who lived where and which routes to take to get to specific locations were acquired through exploration. It aided transportation, and over time the art of orientation developed.

At some point in time, this information became increasingly codified. Drawing the natural surroundings of places explored enables others to recognize the same places on later occasions. Geographical maps make all this information easier to understand, translate, and transfer to others. Without such information, much is based on luck or memory. Anyone who has ever gotten lost knows how valuable this knowledge can be.

Over time, technologies such as binoculars, compasses, back staff and other navigational tools have improved the use and development of maps. With the implementation of airplanes and satellites, existing maps have been corrected and confirmed. We have come a long way from exploring and guessing to knowing and confirming. Today you hardly need to understand a map. With the emergence of smartphones you can view your location, get directions and even proof check your surroundings to the "street view".

Defining civilization

What we have not heard of or cannot see, does not exist in one's world. For instance, The Americas were not part of the European worldview before someone actually went out and discovered it. Likewise, you may understand that something is beyond the end of the map, yet it will not be part of your world until it has been

explored and added to the maps. The map shows your world and what you know as your civilization. Today we have mapped the whole surface of the globe, finalized by the introduction of satellites. However, where does this leave us as human beings? Now that we are all part of the same map, does this mean that we are part of the same civilization?

The geographical viewpoint is one way to understand civilization. After exploring the world by travelling and collecting information, our social perspective expanded. Knowledge of your surroundings becomes knowledge of the location of friends and foes. Origin adds to facts that create differences and unity between people. Your own geographical location becomes part of your identity in relation to others. Those who share this identity on different levels will in some way become part of your surroundings, and thus your civilization.

Mapping ourselves

Perhaps our achievement of full information has degraded the importance of location. We live in a global world, with fast communication and excellent means of transportation, erasing geographical boundaries. Yet, we still proceed to divide the world into regions and grouping people based on their location, two examples being the term *Western Civilization* and the grouping of so many countries and people by simply saying "South of the Sahara."

Maps may reveal the world to us and make us understand more, but they do not remove our human ability to classify each other. Location may have less importance now than before, yet origin still seems to be essential for our understanding of both

others and ourselves. In a globalized world this information still counts, although origin as a geographical location is not necessarily the information we seek, but rather its alignment with our knowledge of the people, history and culture of the area. Being part of the same map has perhaps made us one civilization, but we still use it to distinguish among ourselves.

Now that we are all part of the same map, does this mean that we are part of the same civilization?

Civilization is a size drawn up by the boundaries of its knowledge and technologies. Geography and the map as a technology to rein this knowledge have been part of the overall image to understand oneself as a civilization throughout history. I am born and raised in Oslo, Norway. I know where Oslo is in Norway, and where Norway is in Europe, and where Europe is on the globe. All this information comes from maps and all this information helps me understand myself compared to others. When it says "YOU ARE HERE" on a map, it in fact says "YOU ARE HERE, AND THAT DEFINES YOU".



Siam Florelius
ESST MA student



Tone G. Bjørndal
tone.bjorndal@gmail.com
TIK MA student

TEST OF TIME

Environmental problems have always been a challenge for civilizations. Some have managed to survive those problems, while others have not. As Jared Diamond puts it in his book *Collapse*: "...even the richest, technologically most advanced societies today face growing environmental and economic problems that should not be underestimated." As we continuously degrade and deplete our most important resource - water - we can wonder if our civilization will make it or not.

The biggest difference between earlier civilizations and ours, is that present environmental problems are anthropogenic, man-made. By taking carbon dioxide out of its natural cycle, releasing it into the atmosphere and thus changing its concentration of carbon dioxide, we are causing climate change. Although it is too late to avoid, the consequences can at least be reduced.

The debate about anthropogenic climate change has existed for decades, but we have yet to see the needed results of global climate policy. In addition to growth in population, we are also trying to increase our standards of living. Without effective climate policies and a shift towards renewable energy, it is synonymous with higher emissions and thus, enhanced greenhouse effects.

Will the modern world act on these challenges before it is too late? Or will we become one of many other civilizations that have not survived the environmental problems they faced?

An ancient challenge

Scientists suggest that climate change in the form of decades of drought interspersed with intense monsoons was the final factor that led to the fall of Angkor, the capital of the Khmer Empire, almost 600 years ago. Despite advanced systems for collecting, storing and distributing water, technology was not enough to prevent the civilization from collapsing. Climate change has also affected several other civilizations, for instance the Greenland Norse: Depletion of resources and climate change was two of the main reasons why this civilization disappeared during the 15th century.

We can find similarities between the modern world and the two examples: As the Greenland Norse, we are depleting our resources and as the

Khmer Empire, advanced technology is an important component in our society. In addition, we are also experiencing climate change. But as the Khmer Empire, technology alone can not ensure our survival. And as the Greenland Norse, we can not continue to deplete our resources: already, we are using the equivalent of over 1.5 planets. This development must change towards a more sustainable way of living.

We have an advantage over both the Greenland Norse and the Khmer Empire: We can predict the changes we are causing the climate system. Thus, we can focus on prevention, because we know the causes and effects. There is no single or easy solution, but by using several of the options we already know, we can surely go a long way. It is time to stop underestimating these problems, as Diamond says. We need to stop our habit of procrastinating and start the change.

Even though consequences will be most dramatic in specific regions, it can not be ignored by the rest of the world. Even though Norway can adapt to the consequences we are facing, and will face in the future, we can not ignore the population of small island states getting their land flooded, or the farmers in regions struck by severe drought. When countries such as Norway can pollute without seeing the effects, it results in a type of tragedy of the commons. These countries have a particularly big responsibility, both when it comes to reducing their own emissions as well as helping others reduce theirs. It is time to go from talk to action, in order to avoid dramatic consequences from anthropogenic climate change.

Pollution and the ocean

The ocean is a frightening, but visual example of the impact the modern world has on the environment. Every year, eight million tons of plastics makes its way into the ocean. Plas-

"We need to stop our habit of procrastinating and start the change."

tic is found in the deep sea as well as buried in the Arctic ice. Extensive clean-up as well as better waste management systems are crucial to reduce the quantity of waste in the ocean. This can prevent further harm to wildlife, industries such as transport, fishing and tourism, and even our own food chain. Here, as with emissions and climate change, the ones that are affected by the problem are often not those that are responsible for it.

In addition, the ocean is becoming both warmer and more acidic, which poses a threat to many marine organisms. A warming ocean also increases the possibility of extreme weather events such as tropical cyclones. Society will not benefit from environmental degradation, nor will it benefit from extreme weather.

Water as a scarce resource

Civilizations have throughout history been located near sources of water, because it is essential for human life. Today, humans are threatening the biodiversity of the ocean, and at the same time climate change is threatening humans due to reduced availability of fresh water.

When climate change causes some places to become hotter, drier, or both, populations are at risk. Climate change combined with population growth will reduce the access to the most important resource needed for life itself.

Unsustainable use of water usually occurs in regions that are heavily dependent on irrigated agriculture, as well as areas experiencing industrial development and rapid urbanization. Needless to say, water scarcity poses a risk for humans and our need for drinking water, water for hygiene and food production. It is estimated that almost 1.5 billion people live in areas threatened by water scarcity. For instance, in March this year, it was re-

ported that California only have the equivalent of one year of water supply left in their reservoirs.

Climate change and conflicts

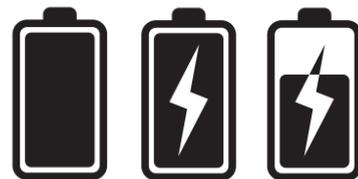
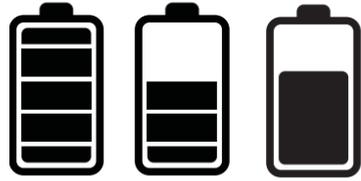
When a resource as important as water becomes scarce, it can also increase the risk of conflicts, and thus, further risks for humans. In fact, a new study links climate change and the conflict in Syria that began in 2011: The drought of 2007-2010 contributed to the conflict, and this drought was likely caused or made worse by anthropogenic climate change.

If our current patterns do not change, we will increase water scarcity and degradation of resources. Production of fossil fuels as well as nuclear power depends on large amounts of water. On the other hand, wind and solar energy do not. Thus, switching from fossil fuels to renewables can both reduce the water scarcity and emissions. Measures towards more sustainable water consumption is extremely important to reduce water scarcity. Combating climate change will not only reduce the risk of water scarcity, but also the risk of several other dangerous consequences. Therefore, this is a crucial task for the modern civilization.

Our current path may very well lead us in the footsteps of so many of the previously advanced societies who have failed to survive environmental problems. But instead of following their path, we should build on the knowledge we have gained from them. This way, we can succeed the test of time.



“Climate change combined with population growth will reduce the access to the most important resource needed for life itself.”



The word power has plenty of definitions. In this article, I will take a closer look at the relation between power - meaning force, might, strength or the ability to do or act - and power, defined as a source or means of supplying energy. What power lies in controlling power? As this article will show: plenty!

The power to transform

It seems as though energy has the power to change societies. When energy meets people it has a performative power. Just as we use our machines and contraptions to harness and exploit natural reserves or resources to turn it into usable energy, energy in itself changes us. Think about it: Where would we be today if it was not for the energy that we have harnessed from our surroundings - regardless of being fossil or renewable? Our lives are powered by energy - our western way of living is dependent on it. I bet you would feel pretty powerless if your supply of electricity or gasoline would disappear. No light, no telecommunication, no computers and no cars or buses. Our society - and hence our democracy - is heavily dependent on energy.

It is a fairly common perception that energy is connected to economic growth. In Norway, we started our energy and growth adventure with Fossegavene - The Waterfall Gifts. Around the beginning of the 20th century, we could turn this gift into electricity for light in people's homes. Increasingly, and especially after the Second World War, we used it to power new industries, as part of a large-scale centralized industrialization, with large factories as the new model. Production of energy intensive products such as aluminium, fertilizers and other

chemicals was located at - or near - the base of waterfalls. Since the discovery of oil in the North Sea in the 1960s, the Norwegian economy and growth has been ever more centered on energy - this time in the form of hydrocarbons. Does this make Norway powerful?

Power and money

Money equals power! Or, so goes a fairly widely accepted saying. However, there is no guarantee that it is so, the important part becomes how money equals power. How is money turned into power? First

"If money equals power, then power equals power."

of all, money allows us to provide for our basic needs. It allows us to climb up Maslow's pyramid. It therefore empowers us to focus on other things than food or housing. Second, money has become a center of translation - almost everything is translated into money. Entertainment, beauty and nature is translated into money, and thus money has the power to define value in our society. What follows is that when you have money, you could buy just about anything. Third, money makes education possible. Acquisition of knowledge is important

in order to be able to take part in democracy or public debate. These three reasons are purposely very different, but serve to illustrate a point: money can to some extent be equal to power.

And so, if money equals power, then power equals power. Energy is a very important commodity. It has enormous economic value. If one controls huge quantities of power, one can also sell it and get rich - and hence powerful.

Military power

Have you ever thought about what powers the machinery of war, or fuels the conflicts in the world? Is it flower power? It has been statistically proven that countries and regions with large oil reserves are more frequently at war - both between nation states and within populations. Think about the invasion of Iraq led by the United States in 2003. Both states are big producers of oil. There is no doubt that geopolitical strategies, among other things, revolve around energy reserves. A current example is the conflict in Ukraine, where Russia has controlled much of the gas supply. The conflict itself is not about energy resources, but gas is both part of the problem and a solution. Ukraine has stated that they strive to free themselves from their neighbor's grip, by importing gas from the west. Since gas is a major

energy source for Ukrainians, Russia in effect has had control over their comfort, their welfare- and to some extent- the people themselves.

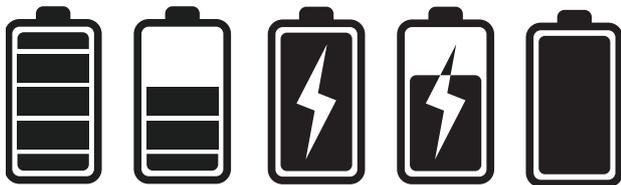
When thinking about the machinery of war and energy, let us linger a bit on exactly what energy allows us to do in a conflict. Let us start with the obvious: It powers the machines. In World War II, a central strategy for the allies was to bomb oil refineries, infrastructure and storage depots - known as the Oil Campaign. The last strategic raid of the war was on a refinery in Tønsberg in April 1945. Reducing Germany's access to energy was a key strategy to weaken them. Another issue of war and energy is the immense power of the atom bomb. As discussed in a separate article in this issue, nuclear energy- or atomic power- has the potential to annihilate life on Earth. If you control nuclear power, you have the power to cause the extinction of the human race.

Plenty of power in power

The power that lies in controlling power is plentiful. Our constant supply and use of energy, empowers us in numerous aspects of our lives. It powers democracy, conflicts and our everyday life. Power has transformed our societies, helped bring people out of poverty and fueled our war machines. Power for good, and power for bad. Think about that the next time you fill your car with gasoline equivalent of the energy content of a small bomb.



Kristoffer Lorentsen
ESST MA student



NEW INNOVATIONS

FOR THE IMMEDIATE FUTURE



The Apple Watch: Apple takes the plunge into wearable technologies with their latest release, the Apple Watch. The watch, which requires connection to an Apple iPhone 5 or 6, is an attempt to move the smartphone base onto the user's wrist. From checking your messages and making calls, to checking into your flight and being recommended nearby restaurants, the Apple Watch promises to be most of what Google's Glass technology failed to become in wearable technology.



Pee-Power: Wasting valuable waste has to stop. The latest contribution comes from the University of the West of England: Pee-power, that turns urine into electricity! The technology is aimed for lighting cubicles in international refugee camps, which are often dark and dangerous places particularly for women. Urine-tricity is produced by a Microbial Fuel Cell, where tiny microbes feed of the urine and produce electricity as a byproduct. Their current prototype is conveniently located near a student bar at the university campus.



Autonomous Pods: The LUTZ Pathfinder is a self-driving vehicle developed by the UK based Transport Systems Catapult (TSC). The urban transport pods are an electric-powered two-seater that moves on their own over a pre-described route. You swipe a touchscreen in the windshield to select a destination, and you can connect your gadgets, read the daily news, check your e-mail or even play a video game during the trip. The program is currently overseeing a trial of three autonomous pods in Milton Keynes.



Ocean Cleanup: The Ocean Cleanup array is a stationary system for catching and extracting plastic pollution from the ocean. The projects mantra is: Why move through the oceans, if the oceans can move through you? The goal is to deploy the technology in the five huge rotating currents, called gyres, where plastics in the ocean tend to concentrate. A pilot project was crowd-funded last year, and full scale ocean cleanup is set to start at the end of the current decade.



The Arc Pen: A lot of common daily activities becomes a struggle for people suffering from Parkinson's disease. A team of British students have come up with an idea for making the daily struggle of Parkinson's sufferers just a little bit easier: The Arc Pen. Through an ergonomic design and small vibrating motors, the pen helps the user write more legibly. Using the pen can even give the user improved motor function for up to 10 minutes after use, making their daily lives all that much easier.

THE MODERN CHICKEN

AN INTERVIEW WITH FORMER TIK STUDENT EINAR JACOBSEN ABOUT HIS MASTER THESIS



Harald Smedal Stamsø
harald.stamsø@gmail.com
TIK MA student

Hi Einar! What is your background, and what do you do now?

I have a bachelor's degree in education, specifically natural and social sciences and some mathematics. After that I got a master's degree from TIK. Right now I am working as a upper secondary school teacher.

You wrote your master thesis on "the modern chicken". This might be considered as a bit of a peculiar topic. Why did you choose this?

Well, first of all I am interested in food and where it comes from. There is a weird paradox in that we as a society are getting more and more interested in food, while at the same time we are getting further and further removed from our food's origin. Demographic trends point to a large degree of urbanization, with only about three to four percent of the population employed in agriculture, so our contact with living animals is very limited. The food industry, and especially the chicken industry, has become highly industrialized and our consumption of chicken has increased by a factor of about four over the last twenty years. In addition, there is this interesting paradox that while chicken production is being done in a very modern, efficient and industrialized fashion, it is being marketed as

very healthy food. In light of all this I thought it would be interesting to do some research into what is actually going on. I settled on this topic right around Christmas of 2013 when I heard about a debate on the allowed density of chickens while breeding them. Norway was going to follow EU regulations and increase the allowed density from 33 to 36 kilograms per square meter. The Food Safety Authority claimed that this would only have a positive effect, which struck me as strange.

What is the modern chicken?

The chicken being bred today is meant to look like a product of nature, however, the chicken will never see the outside world. It is being bred inside, never seeing natural daylight or experiencing natural ventilation. It has been taken out of its natural environment, its natural ecology and put into a thoroughly regulated and controlled environment to facilitate faster growth and the control of disease. The chicken today is different from what was observed just a few years ago. It is interesting to look at the chicken from a number of different ways. On the one hand, you see chicken being marketed as a healthy Norwegian natural product. On the other hand, when you take a closer

look, you will see that there are very strict production parameters. The chicken is strictly separated from the environment around it and if you want to step inside the production facilities you have to go through a thorough disinfection and whatnot to prevent the introduction of pathogens. The modern chicken is a product with quite a few contradictions. Both healthy and natural but also highly artificial. There is a lot of marketing focus on how it is a Norwegian product while at the same time it is being fed South American soy feed, and their parent stock, the chickens' parents and grandparents, are in fact from Scotland. So, basically, we raise chickens in Norway, but we do not really breed them.

Do you have any predictions regarding the future chicken?

Funny thing: While I researched this, I used a manual from a company called Aviagen, which I believe is Scottish. They deliver chickens to all of Europe and have huge market shares. Around 95 percent of all Norwegian chickens have their origin from them. Anyway, I read their very detailed manual on how to raise chickens and, just recently, I saw that they had released a new version of it. While the old manual was very much focused on efficiency and profitability, the new version also added a lot of emphasis on animal welfare, such as Brambell's five freedoms for animals. While it is not easy to predict what is going to happen in the future, there has been a lot more focus on potential side effects of industrialized chicken breeding since I delivered my thesis, such as the problem of multi-resistant

bacteria. Multi-resistant E.coli could pose a major problem for us, because we would not be able to treat it with antibiotics. There has been a lot of focus on this issue lately. I came across something called Narasin while doing my research, a drug used to prevent coccidia, an intestinal parasite. Many of my sources, the Food Safety Authority, Animalia and so forth, were very careful not to use the word "antibiotics" in this regard, but when I read independent research articles about the drug, there was little doubt that this drug was, in fact, an antibiotic and antimicrobial. The Food Safety Authority claimed it would have no effect on the development of multi-resistant bacteria. Recently, however, they seem to have become a bit more humble and have initiated research on the effects of this drug. With the media attention, the amount of chicken sold has decreased quite a bit. So, perhaps in the future we will see a larger share of the chicken market being taken by smaller, ecological producers such as Stange.

In what ways has your TIK-master been useful for you in your work life as a teacher?

Mostly in the form of being a solid academic background. It is difficult to mention anything specific, but writing a master thesis with a solid scientific basis has certainly helped me in terms of analytical skills and so forth.

Would you like to work in the food industry?

Perhaps, but on the end of the production chain. I have always wanted to open a restaurant and microbrewery. Something food-related, such

as a café with good food and drink, might be nice.

Have your eating habits changed as a result of writing this thesis? Do you still eat chicken?

My food habits have not changed much. I did not eat much chicken before I wrote my thesis, and I do not eat any more of it now. If I eat chicken, it is always from an ecological, low-intensity producer. I am by no means an animal rights activist, I mean, I care about animal welfare and all, but I eat meat.

Where do you think there is potential for more research?

Narasin is a specific subject that could use more research. Research on antibiotic resistance is already ongoing, so there is definitely potential there. I recently saw that there was a disputation at TIK on the subject of avian flu. While I did not focus on it in my thesis, it is something I touched upon. There was an idea of the avian flu being spread from wild animals to production animals. However, from what I have read it seems that it is the other way around. So, in general, research on production ecology and the spread of disease is something that deserves more attention. You know, it is a bit of a paradox that while the current mode of production was designed to prevent disease, it might actually be the cause of disease. It goes to show that when you work with nature, there are no guarantees of safety.

Life finds a way?

Yes, exactly.

Harald Smedal Stamsø
harald.stamso@gmail.com
TIK MA student



THE MEGA CITY

Our world is urbanizing and has been doing so for quite some time. Long gone are the days when cities were few, small and far apart. Our main form of habitation has gone through a dramatic change, from the days of villages, to towns, to cities, and to the monstrously large cities of modern times. As a result of this trend of city expansion a new term has arisen: the Megacity.

The word *megacity* invokes powerful and diverse images. Skyscrapers, busy streets, lights, slums, crime, architecture, arts, finance. Yet, whatever comes to mind, one thing is certain: the Megacity is here to stay.

Defining what a megacity is can be difficult and seem quite arbitrary, and the fact that the definition of the term city itself varies between countries is not making it any easier. As such, this article will take the easy way out and use the definition given by Wikipedia, where it is defined as “a metropolitan area of more than 10 million people”. As of 2015, the biggest metro area in the world is Tokyo with 37 million inhabitants - enough to dwarf most countries in the world. In fact, if Tokyo was an independent country it would be the 36th most populated in the world, just above Iraq. Yet, while most megacities are located in Asia, this does not imply that they are uniform; while some are a wonder of organized chaos, others are simply chaos. Some are incredibly dense, while others span over a large area. The most staggering example of density might be Kowloon Walled City: although not a megacity by any stretch of the word, at its peak it was the home of 33,000 people in the space of 2.6 hectares, roughly the size of Ullevaal Stadion.

Today there are 36 megacities spread around the globe. These are so big

that if you were to sum up the population of them all, you would get about 630 million people, almost 10 percent of the world’s population. In other words, modern megacities are big. However, if you want to go truly large, you have to enter the world of fiction.

Megacities in fiction

Numerous works of literature, comic books and films have contained descriptions of mind-bogglingly large cities. In the 1973 film “Soylent Green”, the city of New York has grown to over 40 million people, and is very much a dystopian society plagued by overpopulation, pollution and poverty. In the comic book series “Judge Dredd”, the eponymous character fights crime in the vast Mega-City One, a city covering the entire East Coast of the United States and even parts of Canada, with a population of 800 million people. The idea of the megacity is taken even further in the “Star Wars” universe, where the entire planet of Coruscant has been made into a single city, housing more than 1 trillion people. Common, however, for megacities both in fiction and in reality is that they often are far from utopian.

Challenges

Naturally, when so many people live so closely in such close proximity, challenges tend to mount. The biggest challenge facing many of these

megacities is the fact that the political and administrative divisions may at times not reflect reality. Where previously drawn city lines might have been accurate 50 years ago, the city has now expanded far beyond its boundaries, creating confusion as to who is in charge and where. If the political system is not robust enough, taking care of water, sanitation, trans-

“As of 2015, the biggest metro area in the world is Tokyo with 37 million inhabitants - enough to dwarf most countries in the world.”

portation and other infrastructure issues may become difficult. It would certainly be a bad situation if these systems were to break down in a low density area; in a city it would be a nightmare.

Another challenge facing the modern megacity is poverty and slums, and the subsequent crime rates. This, again, could relate to problems in governing and struggles with adapting to the rapid growth, which so many of these cities have experienced, and

are still experiencing today. Several cities around the world are notably struggling with slums and crime, with the *favelas* of Rio de Janeiro perhaps being the most famous example.

Most pressing, some would argue, is the problem of pollution. Dense cities with a lot of traffic have high rates of carbon dioxide emissions from cars, leading to large amounts of pollution. Combined with the burning of coal and/or emissions from factories, this can lead to smog, a problem which famously plagued London during the Industrial Revolution and, more recently has been a problem in Los Angeles. Other cities such as Delhi and Beijing are also notorious for their smog. This poses a major health risk, as smog can lead to respiratory diseases, birth defects and a host of other health issues.

The future of megacities

Without a doubt there are many challenges facing the modern megacity. This is not to say that it is impossible to solve these issues. New York City, arguably the first megacity, went through major struggles with crime in the 1970s. However, through proactive police strategies, the city is now regarded as relatively safe. In fact, November 28, 2012 marked the first time in the history of the city where 24 hours passed without a single report of violent crime. Not bad for a city with a population of over eight million people.

Now, it should be noted that New York is located in a rich and developed country, and that other growing cities around the world may not be able to solve their problems as easily. Projections by the UN and various other agencies predict that more megacities will pop up around the world, and that the process of worldwide urbanization is far from over. According to one study, we can expect about 50 megacities worldwide by the year 2030, with most of them located

in Southeast and East Asia. While it will not be easy to solve the various problems associated with high density in extremely large cities, it is not impossible. Rigorous planning of transportation, healthcare services, social services, water and sanitation is necessary to ensure a healthy and thriving city.

Regardless of how large cities have developed through history, they all started with a single person or family deciding to build a house there. That house became a village, which in turn became a town, and that town became a city. While it is unlikely to happen in the near future, perhaps Oslo one day will make the leap from city to megacity.





WHAT GOVERNS TECHNOLOGY?

Technology is often considered a modern phenomenon, yet it can be argued to have existed since the dawn of humanity. In this article we will look at how the political governance of technology has evolved and changed through time. So jump into the time machine, buckle your seatbelts and let us start the journey by visiting ancient Mesopotamia.

It is not known whether there was a political driving force behind the invention of the wheel 6000 years ago. It was most likely based on tacit knowledge rather than explicit scientific knowledge, at least in modern terms. Perhaps some bright kid saw the need for something that could transport heavy objects. Since the profession of chiropractic was not yet invented, this invention was a great tool to hinder back problems. Even if we do not know the real driving force behind this invention and there were no social scientists to study it, it would be interesting to follow the involved actors and do research about its emergence. Sadly, Science and Technology Studies had not yet emerged. However, we can consider ancient Mesopotamia as our starting point, as they probably did not have a deliberate technological policy. How might this have changed by the time of the Renaissance?

The Renaissance

People like Galileo Galilei, Leonardo Da Vinci and Nicolaus Copernicus were important contributors to the scientific and technological development during the Renaissance. Furthermore, many powerful people and institutions both supported and prevented technological development. War was often a reason for the invention of new technologies and emperors, kings, dukes, khans, and even the Pope could gain power by being up to date on the latest innovations and technologies. For instance, the peace negotiations between Francis I and the Pope in Bologna benefited from the mechanical lion constructed by Leonardo da Vinci. On the other hand, there are

examples where society has prevented scientific and technological development, as it was seen as tampering with nature, and hence God's creation. Other times, science was hampered because it challenged theories that were already considered general truths, such as Copernicus' heliocentric worldview against the already existing geocentric view. This serves as an example of how science and technology may be seen as objective, but not politically neutral, as people tend to attribute meaning to it. Perhaps Copernicus would have benefitted from the help of one of our present day politicians in revealing his theory. His views were not wrong, though his perspective did not fit the current worldview. Many politicians will know this feeling. Historical examples such as these show that they were not always aware that politics were involved in technological development in the Renaissance.

Modern approach to technology

So what about the modern approach to the governance of scientific and technological development? The current landscape can be argued to be comprehensive and multifaceted. Not only are states and elites part of this development, but so are organizations, corporations and clusters. Another important difference between the Renaissance and today is that, with some exceptions, many current nations are democracies, although one might question how much this has helped the development of technological policies. After all, we could argue that the most "successful" politician in reference to political control of technologies was a man with a funny

moustache, who gained popularity in Germany during the thirties.

With democratic governance of technology, people are supposed to have knowledge and a political opinion about scientific and technological matters - an opinion about things and the knowledge that creates them. To exemplify this: what are, for instance, your thoughts and opinions about robotic seals in nursing homes, the use of antibiotics in meat production and fingerprint scanning as access control? Is it too much to process? Well, you are probably not alone. Many people consider technological development too complex for them to have an opinion about, and think that the development is all right, at least until it hurts them. This kind of ignorance may be problematic because it enables producers to steer technologies in directions that we do not want.

Considering all this, it is important to explicitly govern technological development politically. Despite 6000 years of technological development, we do not have such governance, and if the technological development had evolved at the same pace as the technological policies, we would still live in the Stone Age. We are in need of a catalyst, and although the academic discipline of Science and Technology Studies is still young, it is a start.



Bjørnar Berntsen
bjornar133@hotmail.com
TIK MA student

CAN I PUNCH YOU IN THE FACE IF I BUY YOU A BEER?



Kristoffer Lorentsen
ESST MA student

What is your price? This question serves as an illustration of an interesting topic: valuation! How do you value not having pain or a black eye versus a beer?

Studying practices of valuation

A black eye, or lack thereof, has no monetary value, whereas a beer has a market price. Can their value be compared? Is monetary value even the right way to compare? If you started thinking of an answer, you just practiced valuation. Valuation studies is an emerging field that studies these practices - any social practice where the value or values of something is established, assessed, negotiated, provoked, maintained, constructed and/or contested. The cases might be a bit more serious, but the questions are the same.

Money as a medium of exchange

A long time ago, it was common to trade goods: a fish for a coconut or clothes for mushrooms. Increasingly, and especially in modern societies, money is used as a medium of exchange. Things, services and entertainment are given a market value; they are translated and have become commensurable. Moreover, we translate non-market entities into money. In the case of an oil spill, the responsible company has to pay for the damage - but how do we value the affected nature or wilderness? If you get hit in traffic and break your arm, you might receive a compensation from the driver. How is this compensation calculated? What are the so-

cial implications of this, when beauty or enjoyment is translated into hard numbers?

“Putting a monetary market value on things is only one of the possible ways to do valuations”, says Kristin Asdal, “but it has become a dominating practice. How has this happened?” Kristin is one of our professors at the TIK Centre for Technology, Innovation and Culture at UiO, and she is very interested in studying how valuation is done in practice. She is a member of the advisory board of the journal *Valuation Studies*. The journal has set out to foster valuable conversations in the emerging transdisciplinary field of valuation studies.

Studying the Good Economy

Kristin recently received a prestigious and sizable grant for a 5-year project called «Enacting the good economy: Biocapitalization and the little tools of valuation». “It is my dream project for studying valuation practices”, she says. More specifically she will study cod-farming to understand the emergence of the new bioeconomy - what she calls a Good Economy - and to understand the role of science in this process. “There are two turns in the public debate that are interesting. One is that this new bioeconomy is not only about economic growth. It will also aim to be good: environmen-

tally friendly, responsible and sustainable. How is valuation done in such an economy? A second turn is an idea that science needs to contribute to value creation. Is then science valued in a new way? And what happens to science in such processes of valuation?”

Cod, science, beer and pain

Value and valuation are a constant part of our lives. We can talk about as diverse things as cod, science, beer or pain, and yet talk about value. In our day-to-day lives, we do valuation and talk about value all the time. We use “little tools” - as Kristin would put it - to do this valuation in practice. So what little tools did you use when thinking about the question posed in the title of this article? Did you automatically think about the monetary value of a beer and tried to put a price on pain for comparison? If you thought about the social value of accepting such a proposal, how did you then value it? Good or bad? There is no blueprint for valuation, and that makes the field of valuation studies very interesting. Kristin puts it nicely: “Valuation has huge impacts on us and our societies - it is essential that we understand how it is done in practice”.

“Putting a monetary market value on things is only one of the possible ways to do valuations.” - Kristin Asdal

WHAT IS TIK?

CENTRE FOR TECHNOLOGY, INNOVATION AND CULTURE



Photo: uio.no

ERLEND OSLAND SIMENSEN

GRADUATED FROM ESST IN 2012

PREVIOUS STUDIES: Materials, energy and nanotechnology (B.Sc.) and Economics (B.A.). Both at UiO and Freie University in Berlin.

What did you write about in your master thesis?

I wrote about Norway as Europe's green battery and how Norway could contribute to a better efficiency in new renewables in Europe by importing and exporting more electricity to/from the continental Europe.

What have you done since you graduated from TIK? (career, jobs, further education etc.)

I have worked as a research assistant at TIK, and now I am doing a Ph.D. at the same center. In addition I have co-founded two companies and a webshop.

In what ways has your TIK/ESST education been useful for your job(s)?

I really learned how to digest large amount of literature and within only a year write a master thesis in a new scientific field. ESST/TIK is unique in a way that it is accepted to combine a variety of social sciences to explain the society we live in. I think such a multidisciplinary approach is needed in order to understand an increasingly complex world.

Did you know that students from TIK* are the UiO students most likely to get a job quickly after completed studies, and that they are also the ones with the highest salaries within Social Sciences and the Humanities?

Because of the interdisciplinary nature of the masters, and close ties with private firms and external research institutions, graduates from the TIK Centre have a variety of jobs within business, government and research- the opportunities are nearly endless!

TIK - Centre for Technology, Innovation and Culture - examines the linkages between knowledge, technology, politics and society, through exploring diverse approaches such as economic and technological growth, and how knowledge is created. But what does this actually imply?

The Centre aims to see how technological and economic change is shaped by its societal

context. Through the use of technology we create efficient solutions for complex problems, and Innovation enables us to create and combine ideas into new constellations, reinventing how to utilize the technology at hand. Culture and knowledge are the premises for these processes to unfold.

In this issue we have interviewed three previous students about their experiences since graduating from TIK.

Photo: uio.no



HÅKON SCHJØNBY

GRADUATED FROM ESST IN 2009

PREVIOUS STUDIES: Russian and Spanish language

What did you write about in your master thesis?

I wrote about industrial trade fairs and how firms use these events to exchange information and knowledge about new products and technologies.

What have you done since you graduated from TIK? (career, jobs, further education etc.)

I work at the National Criminal Investigation Service (KRIPOS) where I do forensic examinations of questioned documents. This can be criminal cases with counterfeit banknotes, forged id-cards and passports, as well as anonymous letters. I examine if the documents are "genuine" or "false" by identifying the printing technologies used to produce them.

In what ways has your TIK/ESST education been useful for your job(s)?

Production and counterfeiting of security documents is a battle of technologies. Passports and bank notes with new security features are being reproduced by forgers which use creative methods and combinations of technologies in order to counterfeit them. The approach from ESST helps me to understand the dynamic changes in the security printing industry.

ERLEND HERMANSEN

GRADUATED FROM ESST IN 2006

PREVIOUS STUDIES: Sociology, media studies, project forum (organization studies and management) and criminology.

What did you write about in your master thesis?

Policy instruments for governing large technological systems, more precisely the introduction of a CO₂ component in car taxation schemes, and expected emissions impacts from this change.

What have you done since you graduated from TIK? (career, jobs, further education etc.)

I work at Center for International Climate and Environmental Research-Oslo (CICERO), where I currently finalize my PhD in science-policy interfaces in climate policy. Before that I worked as a communication advisor at CICERO. Prior to that I worked as region leader in an environmental NGO.

In what ways has your TIK/ESST education been useful for your job(s)?

Absolutely fundamental. In many ways my PhD is an extension of my MA, in which I wrote in collaboration with CICERO. Also working as a communication advisor I found the ESST MA very helpful.

*TIK MASTER DEGREE PROGRAMS:

Technology, Innovation and Knowledge (TIK) - 2 years & Society, Science and Technology in Europe (ESST) - 1 1/2 years



Photo: uio.no



Tone Druglitrø
Postdoctoral fellow at TIK
University of Oslo

CONFESSIONS OF A LECTURER

WHAT MAKES A GENIUS LECTURER?

Johan Welhaven was appointed as a lecturer at the Faculty of Philosophy at The Royal Frederick University in Christiania in 1840. Much controversy surrounded the appointment of the well-known poet and writer. Even though he was known to be “a distinctly schooled rhetorical talent” he was said to lack the empirical weight to satisfy the requirements of an academic lecturer. In 1843 however, his three-year trial period was changed into a permanent position. He was commended for the “attractive and elegant style” of his lectures, and was described as holding the “power of a genius”. What makes a lecture attractive and elegant? What is a genius lecturer? In Welhaven’s case it is said that he only needed to dictate his lectures to the students, and they would write down his rationale, word by word.

I have recently taken a “university pedagogy” course, and I want to share some of my thoughts on this issue with you. Because, in a university history context, and from experience, these two words put together seem a

bit awkward. University and pedagogy. Is pedagogy something that should concern academics at all? Well, here is a news flash: The academic lecture has gone through a renaissance and the method of Welhaven would be considered “old-school” today. In contrast to being a university lecturer in the 1800s, university pedagogy is, believe it or not, now required for academic staff. Furthermore, the issue of university pedagogy is not a concern for the academic community alone, but is based on a political strategy of raising the level of “quality” in higher education, the quality reform of 2003.

So what does the quality reform say? Most importantly, it places demands on the lecturer to be concerned with the “building and strengthening of how students learn”. This does not mean that the lecturer has a responsibility to make sure that the student notes every word he or she says, but rather points to a responsibility of the lecturer to ensure that the students in fact internalize what is being conveyed and that the lectures results

in so-called learning outcomes. To ensure learning outcomes, the politicians have decided that there is a need to reflect on the lecture format, and that “the methods in ...higher education have to be based on a multitude [of tools]”.

It is obvious then that much has changed since the days of Welhaven. I note two things in particular: The interaction between the lecturer and the students, and the tools available for ensuring the quality of this interaction. By dictating his lectures, Welhaven did not open up for much interaction between the students and himself. In Welhaven’s defense, he did not have textbooks at his disposal, which forced him to spend time reciting to the students what he himself had access to. It was his way of ensuring learning outcomes.

At the pedagogy course we learned that there exists a plentitude of tools for making lectures interactive and for ensuring the “quality”. Student evaluation is one tool, which provides opportunity for the lecturer (or



the institution) to inquire what the students have learned and if it was to their satisfaction. Other tools we were introduced to were web-based voting and poll systems in which the students could respond to various questions and problems during class. “Micro-writing” and student presentations were other means for ensuring learning outcomes.

All of this is good: We need to work out the relationship between how we lecture and what the students learn. However, parts of the pedagogy course gave me a minor case of pedagogical shock. One reason for this was the idea of having to micro-manage (adult) students that in principle were (or should be) responsible for their own learning outcomes. Another, and related, reason for the incitement was the emphasis on “fun lectures”. I remember one lecture in particular. It was given by a physics teacher sharing her experiences with teaching first-year bachelor students

at the Natural Science Faculty. She had taken on the job to turn around a course where students tended to fail or get bad grades. How was she going to inspire the students to engage with a subject that was of no or only partial interest? The methods she used were, in short, chemistry tricks and practical jokes, and this with great success. Having fun was the solution to inspiring students and to ensure learning outcome.

My confession is that I found myself somewhat provoked by this. The thought of having to stand on my head and juggle coffee cups without spilling to get the students’ attention was just too much. Is it not enough that we spend hours after hours researching, reading, and trying to make various topics intelligible when preparing for lectures? I thought so. As with any shock, I went through stages of disbelief, of anger, of disappointment, until I realized that it forced me to think more carefully

about what I consider to be a good lecture. What would ensure learning outcomes and not at least “inspiration”, and what do I consider to be a lecturer’s responsibility in terms of the learning outcomes of students? Luckily then, after recovering from the shock of “university pedagogy post-quality reform”, I realized that “fun” could mean other things than making objects explode or standing on my head.

What makes for a fun lecture is clearly not a question with a single answer. It depends on a variety of things, including the dynamics between the lecturer and the student group. Further, “what is a genius lecturer” is not a legit question anymore. Thankfully! As it would scare me more to being forced to aim for such a label than doing tricks on my head.

To be pragmatic then, an attractive and elegant lecture would be one that provides “access to” understanding the central concerns and issues of the research field, without going at the expense of the complexity of the subjects and topics we are lecturing in. New lecturing tools can be helpful, but not decisive. More importantly than stacking up the toolkit, I would say, is that the lecturer is self-conscious about and sensitive to how knowledge is disseminated and presented and that the students are engaged and understand that doing academic work is also a craft that needs to be learned. I presume that Welhaven were able to convey sensitivity and engagement of the subjects to be reviewed as attractive and elegant, thus despite the specific format of the lectures. In the end, the most central aspect of teaching, but also one of the most challenging aspects, is as the physics teacher reminded us at the course, that “the students do not necessarily understand why your subject is interesting. You need to convince them!” I think it qualifies as a lecturer’s mantra.



IS THERE AN
ALTERNATIVE TO
MASS
SURVEILLANCE?

Internet security has become an increasingly hot topic in recent times. How might current day democracies use digital technology to empower citizens, and not just big businesses and agencies? Furthermore, how can we avoid empowering abusers?

The internet: a democratic tool?

There are many claims about the importance of the Internet for the future of society. For instance, David Eagleman, the author of *Why the Net Matters*, claims that the Internet will in fact save civilization through, for instance, better preservation of knowledge and predictions of natural disasters along with instant publishing. However, Edward Snowden revealed in 2013 how the Internet is, and easily can be, used for surveillance by people in power. Furthermore, Neil Lawrence, professor of machine learning at the University of Sheffield, warns us that accumulated personal data may lead to a digital oligarchy. In other words, privacy issues may actually hinder democratic use of the Internet.

Networks of hide and seek

There are alternatives to surveillance. One such alternative is The Dark Net, which refers to anonymizing software that hides internet-services from traffic analysis. *Tor* is one such software, and it provides anonymity online by hiding data in layers of encryption, thereby enabling anonymous communication online. This can be vital for contact between whistleblowers and journalists, and for people who live in societies with restrictions to free speech and thereby no possibility of mobilizing out in the open. With internet surveillance as the norm, this type of software is very important.

The interest in encryption software is increasing, and researchers have recently made more discoveries about activity in the underworld of the internet society. Jamie Bartlett from the British think-tank Demos, and author of the book titled "the Dark Net", has written about encrypted marketplaces. One had a selection of approximately 13,000 illegal products for sale from 900 vendors. From

Bartlett's description of the service, it comes across as a dark eBay for illegal trade, complete with customer reviews and customer service. Computer scientist and self-declared digital freedom champion Dr. Gareth Owen from the University of Portsmouth has also done research on Dark Net technology. He was met with disturbing statistics on Tor-encrypted websites: an average of about 80 percent of site-requests during the research period were to child abuse sites. This reveals a technological side effect people do not want to see in regards to a diffusion of privacy-enhancing technology. Does this internet game of hide-and-seek actually benefit society in any way?

Our privacy-enhanced web future

The Norwegian Data Protection Authority documents that more Norwegians care about privacy issues after the Snowden revelations. On a similar note, Jamie Bartlett argues that the Internet will go through significant changes in the next ten years due to this increased focus on privacy. If more anonymizing technologies are developed, this will raise questions about what a privacy-enhanced future may look like, and what this might mean for the private and the societal use of the Internet.

My idea of internet privacy does not include logging on to an electronic wasteland just to send an e-mail anonymously, and let's face it; people not under direct threat by some government should not have to do this either. Communicating without surveillance is a right for every one of us, and a major problem with mass-surveillance is that the collection and use of personal data stands in sharp contrast to values such as transparency, trust, collaboration and mobilization, especially since the internet technology could be a valuable tool

for just that. The term "chilling effect" refers to people self-censoring opinions online due to surveillance and not knowing how this information may be used. To most of us, privacy does not mean hiding to do things that are not accepted in the light of day, but rather about regaining control over our own information and being able to decide for ourselves what this data can be used for.

Encryption software alone is not going to solve this problem. New solutions on several levels and changes on a larger scale are required, in addition to the integration of control over one's own privacy in the design of technical devices. One may argue that, at least for the time being, performing mass surveillance and analysis is too cheap, and that privacy may benefit from new laws and practices that increase this threshold. These are just some of the questions that need to be answered as we continue developing internet technologies.

"Does this internet game of hide-and-seek actually benefit society in any way?"



Tonje Schou Teigland
TIK MA student

ANCIENT INFLUENCES

Even if the earliest civilizations may seem rudimentary for people today, many of the technologies that we now take for granted were actually developed in these societies.

The word *civilization* originates from the Latin words “civilis” and “civitas”, which mean civil and city. The formation of the first known civilization is closely linked to the Agricultural Revolution, which took place between 8000 and 5000 BC. In this time period one experienced a more intensive and efficient food production, which again laid the foundation for population growth and a more divided workforce.

Defining technologies

Compared to previous societies, the first true civilizations had a more complex political and social structure, often known as the state, and the development of new technologies was integral. *Technology* can be defined as the knowledge and use of equipment or techniques in order to solve a problem. Technologies were important tools in the formation of urban development and the domination of the environment. The wheel, the art of writing and sundials are all examples of technologies that were developed in the first known civilizations.

The wheel

The wheel is considered to be one of the most important technologies in human history. It was developed around 4000 BC, simultaneously in both Mesopotamia, Caucasus and in Europe. Based on the law of physics where linear movement goes into a rotational movement, the wheel made it easier to move heavy and large objects around, and hence enabled the construction of larger buildings and mon-

uments. It also made it easier to travel longer distances, which in turn sped up the process of conquering new land.

The art of writing

Writing is probably one of the most important technologies when it comes to the development of civilizations. First developed in Mesopotamia around 3000 BCE, writing made it possible to transmit information, maintain financial accounts and keep historical records, all of which are important in the formation of the state. Writing has many similarities to speech, but in addition it consists of signs or symbols constructed by humans. In early Mesopotamia, the first writing consisted of symbols for each word and later for each syllable. All over the world, the development of writing happened in almost the same manner, although with different symbols and signs expressing different meanings.

Sundial

The sundial is the mother of the modern watch and is an object used to tell the time of the day with help of the position of the sun. The earliest form of the sundials came from the ancient Egypt and Babylon, which used the cast of the shadows from large buildings and monuments as a tool to predict the time of the day. Gradually, a special instrument was developed. The instrument could be built in many different ways. However, most of the sundials indicated the time by casting a shadow by help of an object called a gnomon over a surface called a dial plate or dial face,

and for the sundials to show the correct time it was important to know the local longitude and the direction of the true North. Today you can still buy cheap sundials, however they rarely show the right time due to the lack of adjustment according to the location of the sundial.

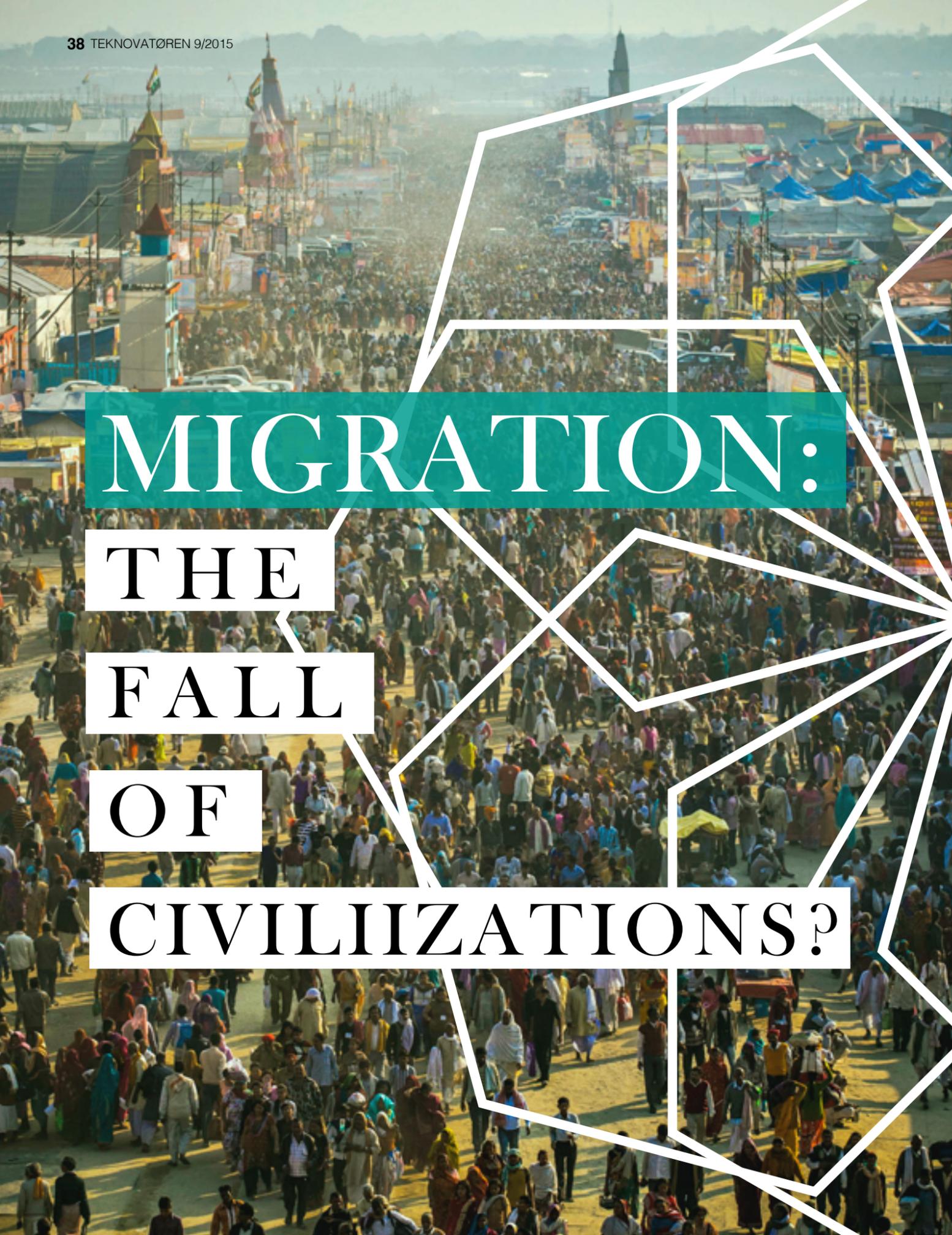
From Mesopotamia to present day

Many of the technologies we now take for granted have their origins from the first known civilizations. How influential has the wheel, developed in Mesopotamia in 5000 BCE, been for the technologies we use today? Very! Just think of transportation: almost everything that helps us get from one place to another uses wheels as a way of movement, save for a few exceptions such as boats or the helicopter. The same goes with writing. Even if handwriting may have lost its position as the main mode of communication to electronically written text, it is still important to master the art of encoding oral language into signs and symbols. These days, your cell phone can actually do that for you! Or how would you manage a day without a wrist watch or the digital watch on your cell phone, in a time where being on time has become so important? These are just some of the connections between technologies developed in the first civilizations and today's many advanced technologies. It shows us that even if we might think of the old civilizations as crude and simple, their confined insight of science and technology has been an important contribution to our highly technological world.



Henriette B. Johannessen
henborjoh89@gmail.com
TIK MA student





MIGRATION: THE FALL OF CIVILIZATIONS?

The number of migrants has never been higher than today. However, people have been moving from place to place since the dawn of humanity. What implications may this have for the concept of civilizations in the future?

Since the first of the *Homos*, the Homo Erectus, emigrated from Africa approximately 200,000 years ago, humans have been moving in and out of regions and areas, and later countries. Before the Agricultural Revolution and the emergence of civilizations, most people had a nomadic or semi-nomadic lifestyle, meaning they were moving from location to location as a way to survive. After the Agricultural Revolution, more people settled and started to live more permanently in one place. However, migration is still something that occurs today, with more than 200 million people living as migrants, both inside and outside of their own respective countries.

Migration and civilization

Throughout history, migration has changed the dynamics and structure of states and civilizations, with the Roman Empire and the European Expansion serving as good examples. Since Christopher Columbus' first encounter with the local population in 1492, the European Expansion into the Americas led to the development of new societies and the destruction of old/traditional ones. With the Industrial Revolution, migration accu-

mulated and, from the 18th century onward, the world experienced an immense growth in migration. Especially many immigrated to the United States due to new possibilities and the promise of a better life. From Norway alone, approximately 800 000 people emigrated to the United States between 1850 and 1950.

Migration today and in the future

There are many reasons why people migrate today, education and the search for a job being two. However, many people migrate because of war, persecution and other conflicts and some predict that the number could become even higher in the future. The UN Refugee Agency estimates that over 200 million people will have to migrate due to climate change. Most of these people live in poor areas in Asia, Africa and the Americas. But also Europe could be affected, with countries such as the Netherlands and Denmark being especially vulnerable to changes in sea level. For instance, approximately 55 percent of the landmass in the Netherlands lies below sea level. Only a minor increase in sea level could therefore be disastrous. When considering that most of this landmass serves as farmland, one

can only imagine the possible consequences this might have for food safety.

What might happen with our concept of modern civilization if more and more people migrate to places where resources are already scarce? One of the reasons for the fall of the Roman Empire was the Migration Period, which occurred between 500 AD and 800 AD, and many historians claim that this was due to overpopulation, climate change and/or famine. Will migration in the future cause the downfall of modern civilization, or could it be a source for diversity and positive development?

“The UN Refugee Agency estimates that over 200 million people will have to migrate due to climate changes.”



Henriette B. Johannessen
henborjoh89@gmail.com
TIK MA student

THREE MINUTES TILL DOOMSDAY

Have you ever watched National Geographic's Domsday Preppers, the TV show about Americans preparing for Armageddon? Did you laugh and think they were crazy or just plain stupid? Most of us probably would. Still, these Domsday Preppers are not so far off. According to the Bulletin of Atomic Scientists, the "Domsday Clock" is ticking. It is now three minutes to "midnight", which means that we are getting closer to the end of the world as we know it.

In August 1945, the United States detonated the first nuclear bombs ever used in warfare, thus ending World War Two. Some of the scientists behind the bomb feared they had unleashed a genie that could never be re-bottled, so they met in Chicago with the goal of opening the eyes of both the public and the policy makers about the significance of atomic power. In December 1945, they published a newsletter called "Bulletin of the Atomic Scientists of Chicago". As the Bulletin evolved from a newsletter into a magazine in 1947, the Domsday Clock appeared on the cover for the first time. The message was clear: The end of time is drawing near!

The final countdown

The Domsday Clock is a symbol representing a countdown to a possible global catastrophe. To set the

time, the board of the Bulletin looks at the balance of nuclear power between superpowers, ongoing nuclear weapons development, a range of broader security issues dealing with conventional non-nuclear weapons and, more recently, climate change. Scientists and nuclear experts meet regularly to determine the time of the Clock. They view themselves as co-creators of history, and they take this job very seriously. The Clock, they say, became part of history, and the responsibility attached to it is huge. It functions as a public warning system, telling people that something serious is happening right now, so pay attention!

Nuclear war

The nuclear age is just a little over half a century old - hardly a grain of sand in the hourglass of civilization. The fu-

ture of the Domsday Clock depends less on the hands of time than on the deadly weapons that are in the hands of people, and what actions that are made to prevent climate change. It is believed that there, at its worst, were approximately 68,000 nukes on Earth - with the majority belonging to the United States and the Soviet Union. This number has fortunately decreased, however there are still 16,000 nukes around the world. The Clock is a reminder that, while you are reading this, someone could use these weapons at any time - meaning that the danger is constant. If someone were to initiate the use of some of these weapons, others would certainly respond. Scientists fear that there is no way to stop a nuclear war once it has started, and a full-scale nuclear war is near synonymous with the annihilation of all life on Earth.

"Scientists fear that there is no way to stop a nuclear war once it has started, and a full-scale nuclear war is near synonymous with the annihilation of all life on Earth"

2015: World leaders have failed

Since 1947, the Clock has moved 22 times, wavering between two minutes and 17 minutes until doom. In February 2015, the board of the Bulletin of Atomic Scientists adjusted the countdown by taking away two minutes from 2012's clock "Five to Midnight", setting it at three minutes to midnight instead. It is the closest the Clock has ever been to doomsday since 1984. At a news conference the group behind the Clock announced that the time had been adjusted to express the group's dissatisfaction with world progress on "unchecked climate change, global nuclear weapons modernizations, and oversized nuclear weapons arsenals" - issues that pose extraordinary and undeniable threats to the continued existence of humanity. The board is relentless in its statement; international leaders

are failing to perform their most important duty - ensuring and preserving the health and vitality of the human civilization.

Setting the Domsday Clock is not an exact science in itself, but it is based on scientific assumptions. It is not difficult to understand that the world is moving in the wrong direction. The Clock represents only one of many desperate cries for help. The problems are made by humans, and therefore must be solved by humans. Most of us can agree that we have not currently implemented adequate measures against global warming. Powerful countries continue to modernize their nuclear weapons in spite of treaties, and rebel groups, such as the Islamic State (IS), continue to terrorize the world. If this trend continues, the Clock will hit the stroke of

midnight before we know it. Then it will be too late. A member of the Bulletin board received an e-mail from a concerned citizen asking: "Why can you not make the world safer by setting the Clock a minute back?" As if the Clock itself were controlling the fate of the world. The board member wrote back: "I wish that was the case, but unfortunately the Clock responds to all the events, it does not control them". We - the citizens of the world - do. We decide the fate of the world.



Lisa Mehre Ystgaard
lisa.ystgaard@gmail.com
ESST MA student



Maria Reinlie
mreinlie@gmail.com
ESST MA student



Ever feel like getting away from it all? To free yourself from the demanding and busy society that seems to always expect so much from you? Need a little room to breathe, but your mindfulness-app and weekend cabin life just do not do it for you anymore? Well, we got the next level escape for you next level people: Leave society all behind! Here is a step-by-step guide for those of you who are eager to straight up drop out of society.

How to leave society

WikiHow.com offers some valuable guidance on how to drop out of society. In addition to some crucial tips and warnings, they provide a concrete step-by-step guide on how to drop out. So, continue reading and absorb carefully if you at any moment feel that the lead paragraph concerned you, and if you are feeling wild!

Step 1: You have to choose the location of your new home wisely. Obviously, it cannot be a city, as you want to drop out of society. Are you a beach kind of person? Or perhaps more of a forest or mountain type? In any case, the key is to make sure that you go somewhere with no human population, yet access to food. Thriving flora and fauna thus serve as good indicators when choosing your new home. Location is everything, society has at least taught us that much.

Step 2: You should do some research on how to survive in the wilderness, so read up on nature and how to live in it beforehand. This will make the experience both more enjoyable and meaningful. For example, when coconuts fall from trees at night and make that scary and loud sound, you will not be scared to death (yes, I am referring to Tom Hanks in *Cast Away*), because you already knew this could happen. In other words, read up!

Step 3: Try it before you buy it. To drop out of society is a big decision to make, so it can be a good idea to try living in the wilderness before doing the actual move.

Try it for a weekend, then come back to society and see how you feel. Are you eager to get back right away? Okay then, do it again, but this time for a week. Still eager to get back and

stay there? If yes, then you are ready for the Big Exit. If in doubt, then this next-level escape might unfortunately not be for you.

PS: do NOT bring food while training! You should practice beforehand how to forage your meals because this skill may not come as “naturally” as you had hoped.

Step 4: You should make a plan for the day of the Big Exit. You have to make sure no one sees where you are going, so it is advisable to leave at a time of day when few people are likely to spot you. Use cash to pay for public transportation out into the wilderness. Some people may try to search for you (especially if you are a somewhat likeable person), so make sure that they do not know where to look!

Tips and warnings

WikiHow also give great tips on things to consider when dropping out of society. For instance, do not tell anyone where you are going unless you are certain that they will respect your wish of being left alone. After all, the more people you tell, the more likely it is that society will come and find you eventually.

Also, try to think of others and not only yourself. Secretly dropping out of society is very much like committing suicide (although obviously not for yourself), and it can be quite a trauma for the people you leave behind. Please think long and hard about such consequences before you do decide to drop out.

Another tip is to keep an open mind. For example, if you discover after your training trips that dropping out is not really your thing, then no shame! It is okay to quit the process- it only

means that maybe you are more of a conventional cabin type after all.

Another crucial tip is to bring a satellite phone, and this is important: just imagine realizing that you do not want to spend the rest of your days in the wilderness after all, then what do you do? You will probably need some help getting out, and it would be quite a bummer if you did not bring a backup-phone. Also, if you get really sick and do not want to die alone in the wilderness, it would be pretty awesome to have a phone somewhere close, would it not?

Please take into consideration these WikiHow-warnings as well:

- Prepare for all seasons! Sure, relaxing on the beach with a coconut sounds pretty cool, but remember: Winter is coming...

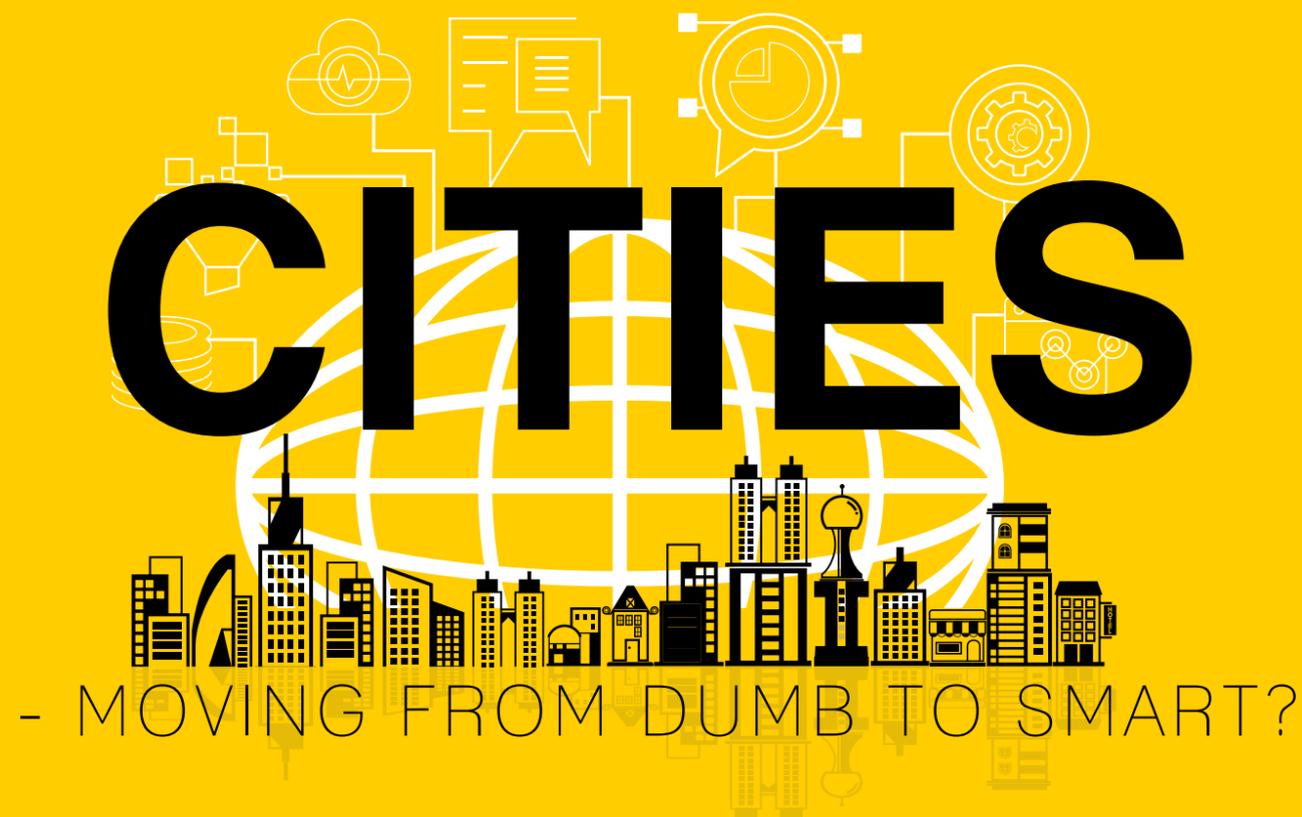
- Dropping out of society may sound cooler than it is!

Have you ever stopped to think that maybe your struggle is not so much with society itself, but rather the environment you live in? Maybe moving to another city is the change you need. It is totally fine to not always take it to the next level. So make sure that you are dropping out of society for the right reasons!

And finally, please consider this warning before you drop out:

YOU MIGHT DIE. A BEAR CAN EAT YOU OR YOU MAY STARVE TO DEATH. DROPPING OUT OF SOCIETY COULD SERIOUSLY DECREASE YOUR LIFESPAN. BY A LOT.

Still feeling wild? Well go on then, you crazy bastard!



CITIES

- MOVING FROM DUMB TO SMART?

Tensions rise as the cities we live in become more and more crowded. We produce growing amounts of waste, our roads are congested and public transportation is slow and unpredictable. The era of Big Data brings hope and promise of a better and more organized future, but are we sacrificing something on our way there?

The quest for smarter ways of living together and organizing our lives has always been at the core of the evolution of civilizations. This innovation process has driven economic development and growth in many ways since the beginning of time. Yet, despite the vast efforts that are constantly being put into this development, it is an incremental and slow process, with few major and disruptive innovations. Although many see the development as a process that is pushed forward by technological progress, it may be better characterized as a demand pull. The demand for better public

transportation, better waste management, improved water supply and infrastructure has become inevitable as more and more people have migrated to already heavily populated areas in search for employment.

No more flying cars?

Flying cars and personal robots may not be the solutions we are looking for. However, there are promises of a better, cleaner and more organized future on our doorstep, often portrayed as a series of disruptive technologies that will radically change the way we live.

With the merging of Big Data and urban planning, the smarter cities are on their way. This somehow implies that we have been living in dumb cities up until now, and in many ways, we have. A city of the past reacts to political priorities and interests, whereas a smart city uses the data flow that is all around us to make better, faster and more environmentally friendly decisions in real-time. With a connected city comes the promises of no traffic congestion, and better management of both waste and essential supplies. Big Data allows improvements to be targeted where the shoe pinches at

that exact moment, or rather the next few moments as predictions may become more precise. If we are to accommodate a growing number of megacities, they need to be smart.

Making cities smart

Imagine a city that responds to the immediate needs of its citizens. This requires large scale monitoring of what is going on, although it does not necessarily imply the monitoring of individuals but rather the pattern of their aggregated actions. This monitoring will include smart meters managing energy consumption, water usage and waste disposal, with indoor temperature being adjusted whenever people are not present in homes and office buildings. Knowing when people will reappear will allow the temperatures to adjust in time, and knowing when the bin is full will inform the waste collector to empty that particular one, and not all others, thereby saving them time on the round. The environmental organization Bellona has reported a potential reduction in energy consumption by up to 30 percent in cities like Oslo and Bergen with smarter energy management based on existing technology, indicating that the potential savings in energy alone could make it worthwhile.

Driverless cars, which are already being launched in some parts of the world, may not solve traffic congestion on their own, but they will certainly reduce the risk of accidents. Furthermore, their sensors can communicate traffic flow to a traffic central. In turn, traffic lights can divert traffic accordingly, or travelers can be notified if public transport will get them to their destination faster at a particular moment. There would be a lower need for cars, as the car may be used for other purposes when you do not need it. For instance, Uber, or other car sharing companies may find a way to put it to better use, eliminating the need for conventional taxi drivers.

Although driverless cars are under development, their general distribution may be at least a decade into the future. Big Data enabled traffic flow control may not be. Large tech companies are currently working in a range of cities, combining GPS data from buses and public transport with traffic cameras and adding weather data and input from smartphones to predict what near future traffic will look like. Appropriate measures are then implemented to alleviate problems that might occur and, better yet, this is happening right now!

The potential for less consumption, less traffic and major energy savings should encourage us to take the smart step into the future. The resources saved by using smart technology will help alleviate the pressure on public budgets, and the insights we gain may enable the further development of smart technologies in other fields. A smart city should integrate a smarter and more responsive healthcare system, police forces and other public services. Detecting crime in action, or even accidents and failing health in individuals will enable authorities and health personnel to be more responsive, and even on the spot only moments after an incident.

Nineteen Eighty-Four

As many of these technologies will certainly pave the way for easier, greener and more sustainable living, there is also a glooming shadow of mass surveillance and an Orwellian society on the rise. The ethical boundaries need to be drawn - but somehow it seems that no one is up to the task. Without these boundaries, there is no control over who has access to our personal data, or how the data may be used. The security of our data may become as important as personal security, so the question is: Can we achieve a smart future without sacrificing the comforts of privacy?

The potential for less consumption, less traffic and major energy savings should encourage us to take the smart step into the future.



Espen Berg-Larsen
ESST MA student



Magnus Jacobsen
magnujac@gmail.com
ESST MA student



THE TICKING COGWHEELS OF TIME

Few things have shaped modern society more than the technological artefact of telling time, namely the clock. From the moment of birth to the moment of death, and every part in between, cogwheels and dials dictate your life.

Studying civilizations is said to be a study in cultural changes. With that in mind, the cultural impact of the clock, and especially the personal watch, can be seen as a cornerstone in what we have come to know as modern civil life. It is a never-ending yardstick by which we measure and define every aspect of our existence: where you are or should be in a given moment, how long until the next thing, and ultimately how long it is until the end. It is what binds the individual to the group, making societies go round and thereby keeping us civilized.

Since its invention in the sixteenth century, the watch has been an ever-present aspect of urban society. It was the central aspect of the rationalization and industrialization processes of the eighteenth and nineteenth centuries in both science, politics and society and a depiction of the modern world.

Today, time is closer to our bodies than ever before. Through the development of several new applications and its integration into technological artefacts, time is everywhere. The smartphone is a prime example of how time dictates other technologies. Working at a distance through a device that is as close to us as the wristwatch, time has made the smartphone into a modern clock; expanding its use to add detailed descriptions of everyday life to the ticking cogwheels. For instance, no conven-

tional watch would tell you that your bus-pass is expiring, or who posted what, where, and at which time. Neither would a watch show you a map to tell you where you were supposed to be right now. In other words, the modern watch is taking the governing of time one step further: it not only tells you when it is time to go and do something, but what to do and where to do it.

*“Human existence
is translated into
hours, minutes
and seconds.”*

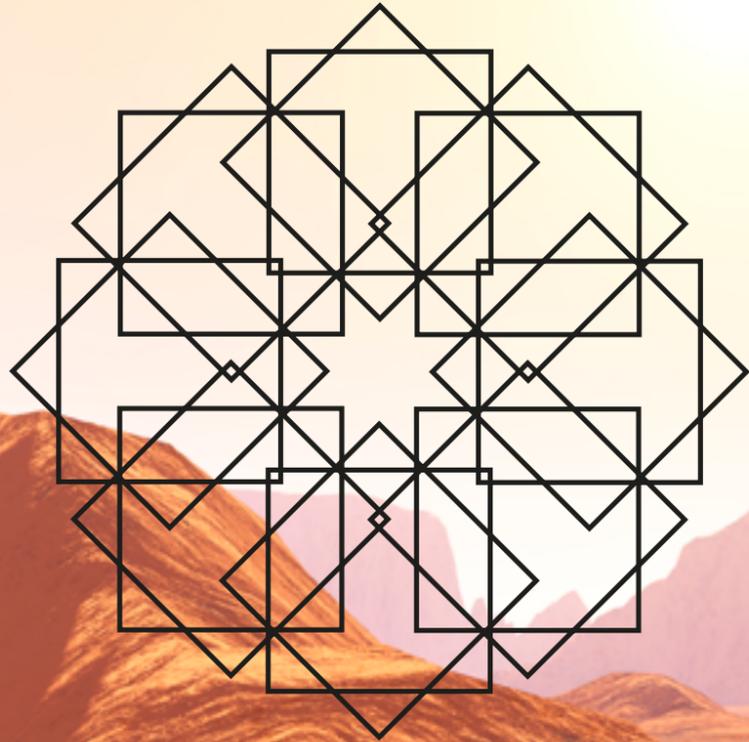
As such, human existence is translated into hours, minutes and seconds. Not just in a purely personal sense, but also in a panhuman way, measuring the time until the world is changed by our actions. We measure the time until our own destruction and the time we have left to turn it around, through scientifically calculated timetables in relation to the time we all share. Still, as concrete as this may sound, time is such an abstract term that we are seemingly not feeling the fear of it running out strongly enough to take serious action. As humans, we also have an affinity for the im-

mediately satisfying, hitting snooze an extra time, fighting the clock and thus fighting ourselves. Technology is of course purely rational in its nature, of which time is an example par excellence, though our reaction to it does not necessarily follow the same logic.

When stepping out of society by walking out into nature and blending with the trees, as many do in their spare time, one commonly thinks of it as taking a break from it all, saying something like “time stands still” or that it is of no importance “out here”. Time is not measured by human minutes in nature; it is measured by sunlight, hunger or the need for sleep. That is what makes the clock such a purely cultural product. Although time is based on the same logic as the describing planetary movements, the universe does not follow this same logic. In the last instance, we are bound to follow its logic, not the other way around. Without our existence, there would be no time at all, or at least no one to account for it. Still, the planets and the universe would move on. This is the contrast of human creations to its surroundings, and what makes the clock the machinery of civilization; the minutes we are given are our own.



Tommas Måløy
tommasm@student.sv.uio.no
TIK MA student



EPILOGUE TO PROLOGUE: MARS ONE

Comedy, tragedy or travesty? The Mars One mission promises to restart civilization on Mars, with the permanent settlement of colonists. There are, however, some issues with the mission's feasibility.

The increasingly controversial and media hyped Mars One mission promises to lay the foundations for the extension of human civilization to another planet within a timeframe of 20 years. The plan of Mars One is to use more or less existing technologies to create a permanent settlement on Mars with a budget of six billion dollars. According to schedule, the first colonists will land on Mars in 2027, after precursor missions have delivered the key components for settlement. The project should be lauded for its international and non-political approach to space exploration, and being an ideologically driven, crowd funded initiative, it would be nice to see them succeed. However, there is also the looming risk of a tragic outcome, and the criticism directed at the project has been sharp.

The plan

Mars One is notoriously vague in the details of its plan, a fact that has drawn a lot of criticism. According to its webpage, the primary feature of the missions design, and also the crucial factor that is supposed to enable it to reach its goal within its absurdly small budget, is that there is no return mission. The recently revised timeline for the mission sets the landing of the first team to 2027. The project is currently in the process of crew selection, with training of the crew starting later this year. The next milestone is in 2020 with the launch of a communication satellite and a rover to prepare the way for human settlement. In 2024, a second rover and two living units, together with a supply unit, will be launched, and in 2025 the rovers will assemble the life support system and make sure the base is operational before the first crew arrives in 2027.

Mars One claims that experiences from Skylab, Mir and the International Space Station are transferable to living on Mars. It bases the feasibility of its plan on five design features; permanent settlement, use of in situ resources (ISRU), solar panels, existing technologies and choice of suppliers based on balance of cost and benefit, as it holds no national preferences. Permanent settlement means that costs are cut significantly, considering that equipment and propellant for the return makes up a significant amount of traditional mission costs. This design feature is also what is supposed to make the goal attainable with existing technology. As for the in situ resources, water from the soil will be used for drinking, farming and producing oxygen, and nitrogen and argon will be extracted from the atmosphere. 3000 square meters of light solar panel will provide energy for the first settlers. The international but apolitical bit means that they will chose suppliers of technology based on balance of cost and quality. These design features are supposed to make the mission feasible. Not everyone is convinced though.

Feasibility issues

A report made by PhD candidates at MIT highlights some of the problems with the technical feasibility of the Mars One mission plan. Focusing on the feasibility of the habitation, life support, ISRU, and space transportation technologies, the MIT engineers are concerned that several of the key technologies required for permanent settlement is not at a sufficient level. Furthermore, they found that spare parts would quickly become the main resupply item. The ISRU technologies, which are supposed to be used,

are not at a sufficient readiness level, most of the operational experience is drawn from tests conducted in Hawaii between 2008 and 2012, and as such, there are great uncertainties in both reliability and size of the ISRU system.

In the baseline simulation, with no ISRU derived resources, the first death from suffocation was estimated at about the 68th day. This would be due to insufficient oxygen partial pressure in the environment, meaning they will die from altitude sickness. Also, plant growth for space applications are still in early stages of development. Only a handful experiments have been carried out in space, and on a small scale. Furthermore, simulations showed that as crops of plants mature, another risk becomes excessive oxygen production, and as the concentration increases so does the risk of fire. Another issue, according to the simulation, is that the colonists will need 150 square meters more growing area than planned. It will come down to a choice between continually adding nitrogen and depleting the nitrogen reserves to reduce oxygen concentration, or risk a hazardous concentration of oxygen. The bottom line is that the modifications required for circumventing these design flaws make resupplies from earth the cheapest alternative. Furthermore, the habitation module is based on the Dragon capsule of SpaceX, but SpaceX have announced no plans to modify the design according to the specifications of Mars One. These are only some of the concerns voiced.

Civilization: Act two?

There are also problems regarding the financial feasibility. The current budget for Mars One is at about 700 000 US dollars. According to their own budgets, they will need six billion, most of which will come from private investors and the making of

a reality TV-show of the astronauts performing tedious routine labor, and perhaps suffocating or burning. Except from the grim outline of failures derived from the MIT report, hopefully little action of the sort that reality TV viewers are attracted to will take place. As the Apollo program demonstrated in the 1970s, TV audiences can be fickle when it comes to space exploration. One might get tempted to think that, except for the take-offs and landings, the viewers may not sustain their interest in the Mars One colonists' daily routines. Another concern connected to the feasibility of the budget itself is that NASA estimates that a Mars mission will cost approximately 100 billion dollars, albeit with return to earth estimated at approximately 35 billion dollars. Mars One will still have to cut 94 percent of that budget.

There seem to be little dissent as to the possibility of a Mars colony given enough money and time. The Mars One in its current state has drawn serious criticism on grounds of its time frame and financial model. As the Nobel Laureate and ambassador for the mission, Gerard 't Hooft, says about the mission plan "you have to put a zero after everything" meaning they need a lot more money and time. None of the feasibility issues is insurmountable given more time and money, and as such, the financial feasibility issues might well be the gravest ones.

Should they succeed, it would make for a great prologue to the next phase in human history. The transplanetary migration of humankind has been deemed a necessity for its long-term survival, so one may hope that it eventually occurs. In this regard, Mars One may or, perhaps more likely, may not set the final stage for the next iteration in the play of human civilization. That is, if they get it off the ground in the first place.



“The crucial factor that is supposed to enable it to reach its goal within its absurdly small budget, is that there is no return mission.”

RESIRKULER SOM EN SUPERHJELT!


PLASTEMBALLASJEN
MÅ VÆRE REN!

SPLASH MAN

ALIAS: Per-Christian, far til to, kalt Pekka blant venner

SUPERKREFTER: Ingen overnaturlige krefter. Men et ønske om å redde verden litt hver dag gjør at han ikke blander plast og kartong, og sørger for at emballasjen er ren når den leveres til resirkulering.



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Visiting address: Eilert Sundts Hus, Moltke Moes vei
31, 0851 Oslo - Norway

Mail address: P.O box 1108 Blindern 0317 OSLO
Norway

Phone : +47 22841600 / Fax: +47 22841601 E-mail
address: info@tik.uio.no