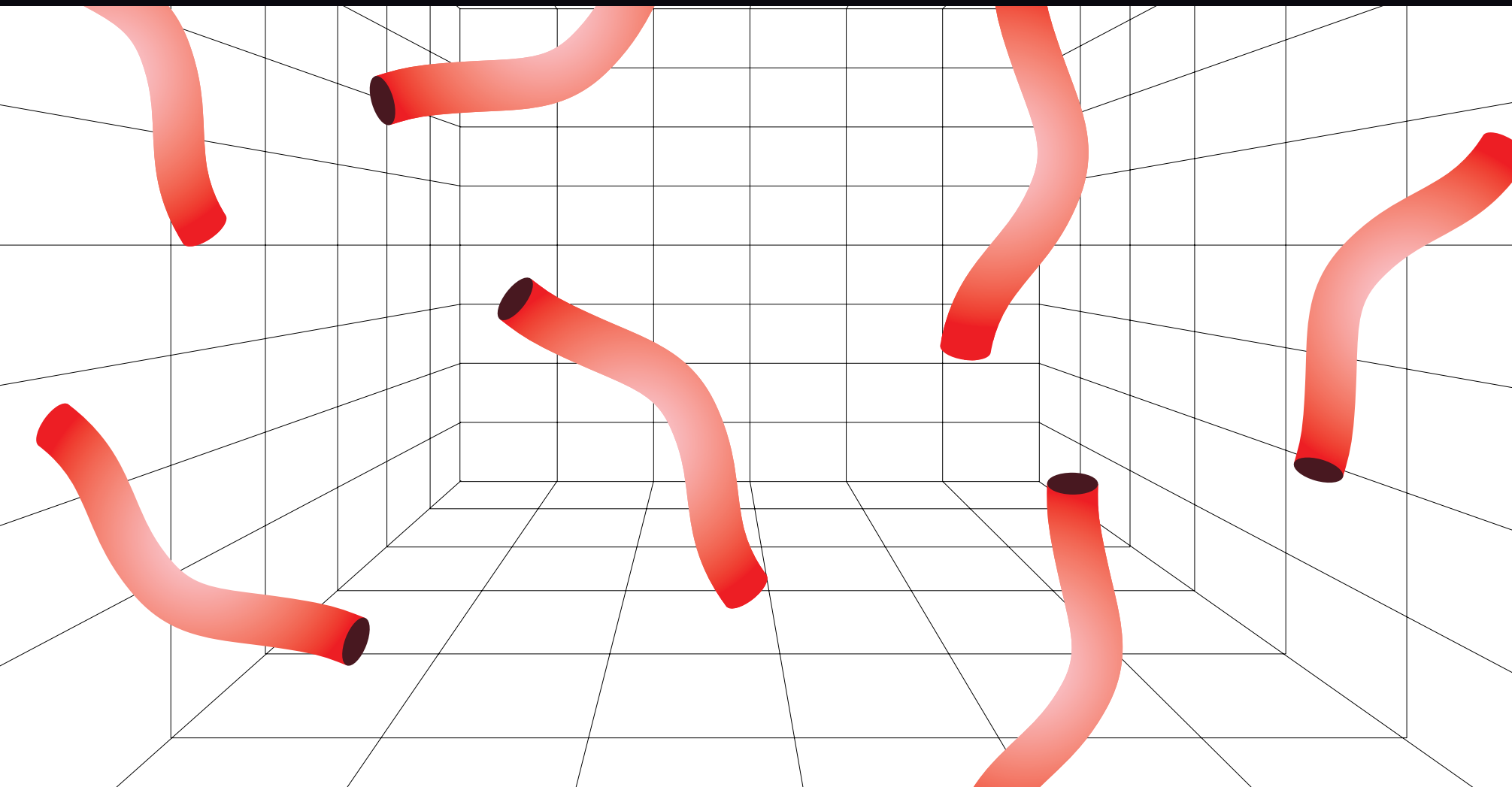
INFRAGRAPHY

VOLUME IV

FALL 2020



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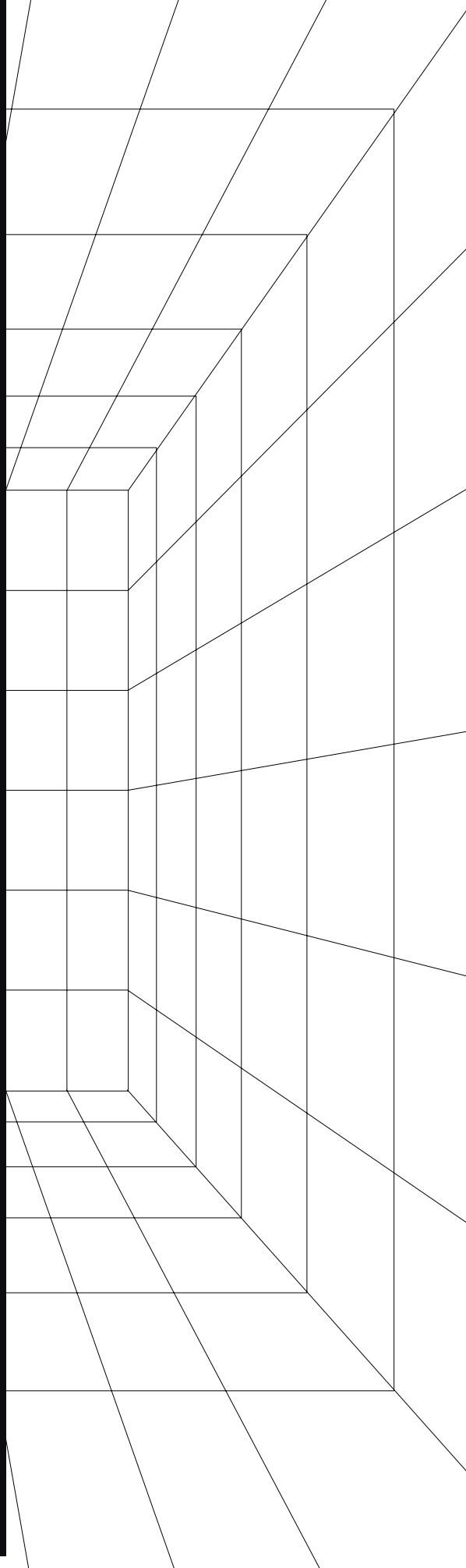

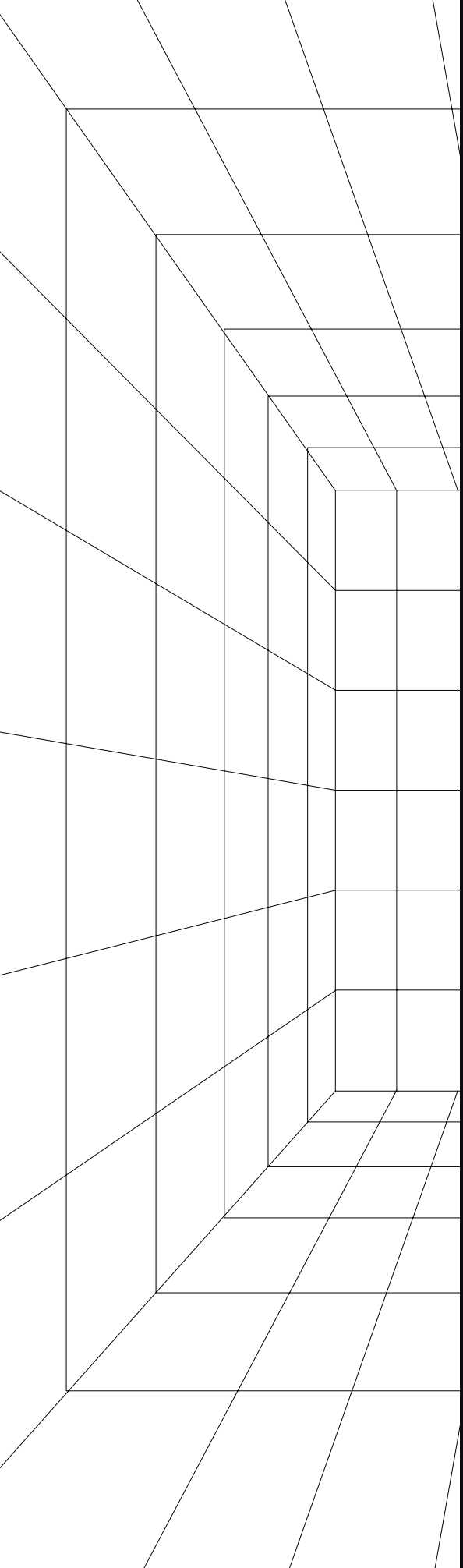

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INTRODUCTION

Samir Bhowmik

9 December 2020
Helsinki

Infragraphy is a compilation of critical student artworks and short essays dealing with the materialities of media technologies and their environmental implications. The volume presents artworks and texts from the course 'Media and the Environment' in the Fall of 2020 at the Department of Media, Aalto University. The course is a series of scholarly readings about and around the themes of media including media's relations and impacts on the so-called Anthropocene, thermocultures of media, ecologies of fabrication, media and plastics, Internet of Things, Planned Obsolescence, e-waste, and media's energetic landscapes. A key approach of the course is to introduce artistic methods and practices that could address emerging media materialities. The student artistic outputs are presented in a final exhibition.

This fourth volume of Infragraphy compiles a series of artworks and companion essays as a response to the contemporary discourse of political economy of media and related environmental implications. The volume begins with Lassi Häkkinen's Screen of Death that plunges us through the computer interface and web browser to a distant cobalt mine in the Democratic Republic of Congo. His accompanying essay meditates on the disjunction between the digital, mining and labor, as a way to reflect on extractive practices. Phuong Nguyen's De-Terraforming Impacts of Humans on Earth takes us on a virtual tour of damaged landscapes as a result of the digital starting from the environs of Silicon Valley, Bayan Obo mining district in China, to the Great Pacific Garbage Patch. Cloud Materialities by Qianyu (Sienna) Fang sets up a game-like low-tech alternative computer interface to examine critical themes related to the various materialities of digital media. Oskar Koli's provocative kinetic sculpture installation makes us ponder on deep time, automation, and fossil fuels. The installation sets up the recursive stroke of a programmed and automated feather that brushes off grains from a piece of coal. Koli insists on calling it 'Untitled' since the viewer could very well have a multitude of interpretations.

Addressing environmental damage, Anze Bratus uses pollution datasets along with urban images from around the world to create generative soundscapes. His installation Acoustics of Pollution highlights how pollution levels as a result of a legacy of industrial activities and fossil fuels exponentially increase and damage the environment. Studies on Invisibility by Tuula Vehanen examines urban radiation, especially with regard to 5G networks in Helsinki. Vehanen's photography attempts to render radio frequency visible and provokes us to consider the impacts of exposure to humans and ecosystems. By poetry and painting, Dominik Fleischmann's Restless Bodies reflects on technology and purity. His work makes us think of where technological necessity of perfection and extraction might eventually lead us. Finally, Mirya Nezvitskaya presents a performance installation Collecting Your Waste that combines her research in materiality, posthumanist philosophy, performance and artistic practice. Her work challenges us on many levels by threading together colonization, extraction, plastic waste and performance.

SCREEN OF DEATH

Lassi Häkkinen

Figure 1.1 Installation Screen

The technology we use to work and study, to engage with social media and to consume entertainment appear as shiny, pure and clean. Smooth parts made of glass and aluminium, plated with chrome, feel and look good. But do they actively try to make us forget where they really come from? 'Designed in California', 'Assembled in China'... but mined where and at what expense?

To be honest, I think many of us are at least on some level aware of places like Baotou, where not far away from the city centre there is a huge toxic lake, result of all the waste generated by the mining of rare earth minerals. Those exact minerals will be then later found from our pockets and desks in the form of phones and computers [1].

Environmental disasters are not the only result of the upkeep and development of our digital media infrastructure. Human casualties are not separate from this either. Mining rare earth minerals can quite often mean unsafe working conditions and the use of child labour. The Democratic Republic of Congo (DRC) is known for its reserves of cobalt, an essential material for e.g. lithium-ion batteries used in a wide variety of devices like phones and electric vehicles. DRC produces over 60 percent of all the cobalt used around the world [2]. And it is no surprise that not all of that is mined under safe conditions and without child labour. So while humanity tackles climate change by replacing diesel and petrol cars with electric ones, we should not forget who might be on the other end of the whole production chain. And as I mentioned earlier, it is not just electric vehicles, but a huge part of our global digital media infrastructure that might have a child working on the bottom of the chain[2].

Raphael was one of these children. I read about his story from Siddharth Kara's article in The Guardian. Kara is an author and researcher who covers the topics of modern slavery and child labour. Raphael was born in DRC, orphaned as a baby and raised by his mother's sister. When he was 12 years old, the family didn't have any more money to keep Raphael in school, so he had to start working. Apparently that is what most kids in the village had to do – to work at a cobalt mine. He worked as a surface digger until he turned 15 and was strong enough to start digging tunnels. Two years later a group of 30 diggers, including Raphael, were deep underground when the tunnel collapsed. None of them survived [2].

This digital media infrastructure we nowadays consider to be essential for everyone all around the world is in fact a privilege. And quite often the ones who make its existence possible in the bottom of the chain by mining and doing other physical tasks are not part of the infrastructure at all as users. Sean Cubitt (2016) examines this inequity of digital media well in "Ecologies of Fabrication." As a starting point, he addresses one the core questions around the topic:

"...whether the number and scale of media technologies that we use in the developed countries can be expanded to the rest of the world, and whether that expansion can be sustained. The development perspective places greater demands on tactics of sustainable design because it asks whether there are enough materials and energy available in the finite system of the planet to provide them, in the forms we are now familiar with in the wealthy world, to the tree billion people still living beyond the range of our most fundamental technologies." [3]

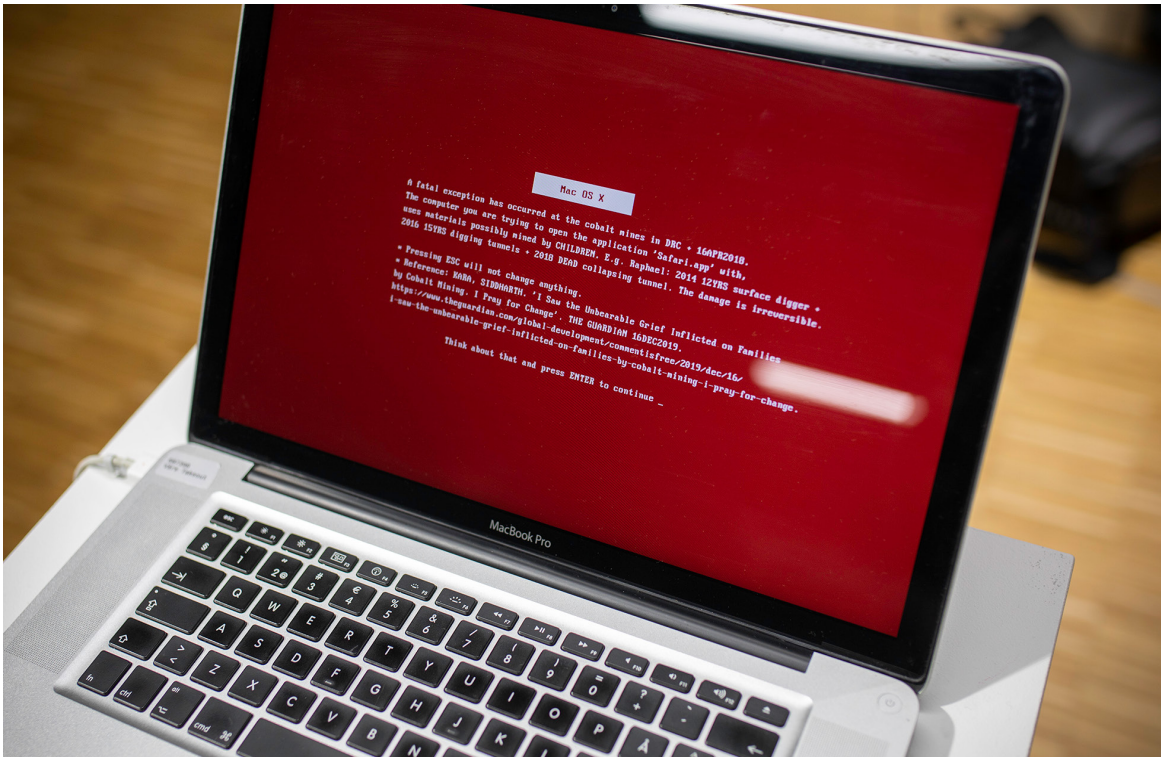

Figure 1.2 Installation

How long can a system that is built on top of abuse and inequity last? We are aware of these issues. We read about them on the screens of our devices that are composed of the materials Raphael and many others have lost their lives over. But still, they seem somewhat distant. How could these issues be made visible? In what ways we could present these dilemmas as well as provoke a confrontation with the ethics of digital labor and mining?

I developed the concept of a computer virus that would first shock the user personally by duping them into believing their computer is at fault. Screen of Death is a Safari web-browser launcher that replaces the user's original Safari in the dock. When the user opens the browser they unwittingly deploy the non-harmful Screen of Death. The launcher pops open a red panic screen that mimics the widely familiar aesthetics of the legendary "blue screen of death" [4]. But when reading through the text on the screen the user notices the fatal error has not occurred inside the computer but at a cobalt mine in DRC. Through this I hope to raise the question "Which is worse?". The user can then exit the Screen of Death by pressing the enter key and the real Safari web-browser will open with Siddharth Kara's article "I Saw the Unbearable Grief Inflicted on Families by Cobalt Mining. I Pray for Change".

In "The Anthrobscene" Jussi Parikka (2015) wants us to rethink the idea of the anthropocene. As he says: "The addition of the obscene is self-explanatory when one starts to consider the unsustainable, politically dubious, and ethically suspicious practices that maintain technological culture and its corporate networks." "To call it "anthrobscene" is just to emphasize what we knew but perhaps shied away from acting on: a horrific human-caused drive toward a sixth mass extinction of species." [5] And, like the examples presented earlier in this text show, the obscenity seems to have no borders. It is the entire planet and all life that depends on it that are affected. The Anthrobscene is an epoch where our crumbling morals drag down everything else with them.

Notes

1. Maughan, Tim. "The dystopian lake filled by the world's tech lust" BBC. April 2, 2015. https:// www.bbc.com/future/article/20150402-the-worst-place-on-earth. Accessed December 1, 2020.
2. Kara, Siddharth. "I saw the unbearable grief inflicted on families by cobalt mining. I pray for change" The Guardian. December 16, 2019. https://www.theguardian.com/global- development/commentisfree/2019/dec/16/i-saw-the-unbearable-grief-inflicted-on-families- by- cobalt-mining-i-pray-for-change. Accessed December 1, 2020.
3. Cubitt, Sean. "Ecologies of Fabrication." In: Nicole Starosielski and Janet Walker,
eds. Sustainable Media. New York, NY: Routledge, pp. 163-179 (2016).
4. Meaney, Evan. "Sympathy for the Blue Screen of Death" The Atlantic. December 6, 2013. https://www.theatlantic.com/technology/archive/2013/12/sympathy-for-the-blue-screen-of- death/282015/ Accessed December 8, 2020.
5. Parikka, Jussi. The Anthrobscene. University of Minnesota Press, 2015.

DE-TERRAFORMING IMPACTS OF HUMANS ON EARTH

Phuong Nguyen

De-Terraforming impacts of Humans on Earth reminds us of the harmful side of planetary-scale interventions as driven by media technologies. Its goal is to raise awareness by providing information for viewers. I have created an interactive map that takes viewers through selected locations on our planet to explore Parikka's Anthrobscene from multiple perspectives: water use, mining, plastic, urbanization, energy consumption, and materialities of media technologies [1]. These locations all share a common aspect: the trade-off between humanity's development and the environment. Below are two sites of environmental damage as a result of media technologies and the indiscriminate discard of plastic waste.

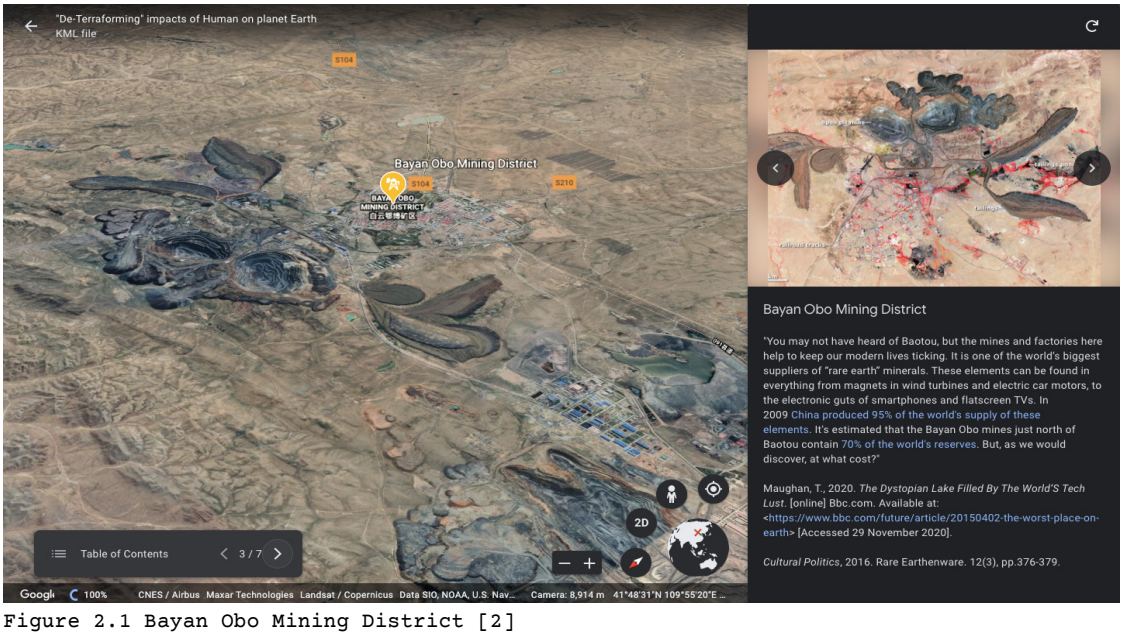

Figure 2.1 Bayan Obo Mining District [2]

Baotou is a city in China where its mines and factories help to sustain our modern lives. It is one of the largest suppliers of "rare earth" minerals with an estimate of 70% of the world's reserves (reference, 2020). These elements are essential in manufacturing everything from wind turbine magnets, electric car engines to mobile and flatscreens. In 2009, China produced 95 percent of the world's supply of these minerals [3].

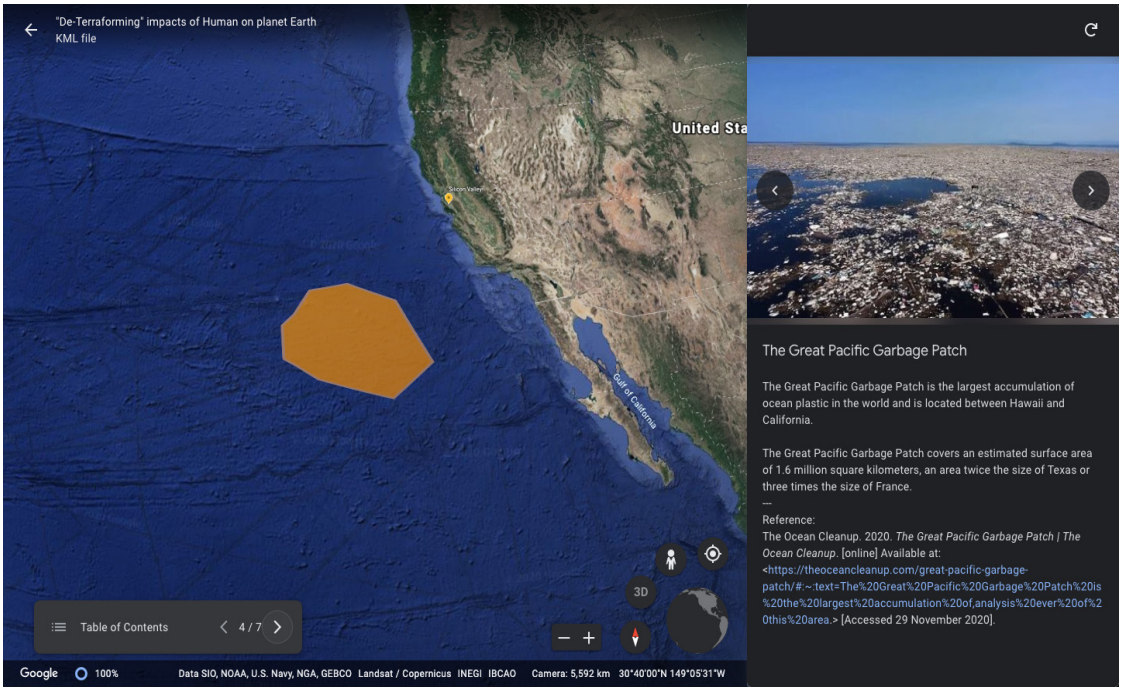

Figure 2.2 The Great Pacific Garbage Patch

The Great Pacific Garbage Patch is located between Hawaii and California and is the world's largest concentration of ocean plastic. An approximate surface area of 1.6 million square kilometres encompasses the Great Pacific Garbage Patch, an area twice the size of Texas or three times the size of France [4].

Notes

1. Parikka, Jussi. The Anthrobscene. University of Minnesota Press, 2014.
2. Bayan Obo Deposit. Mindat, 2020. https://www.mindat.org/loc-720.html Accessed 4 December 2020.
3. Maughan, Tim. The Dystopian Lake filled by the World's Tech Lust. BBC.com. https://www.bbc.com/future/article/20150402-the-worst-place-on-earth. Accessed 29 November 2020.
4. The Ocean Cleanup. 2020. The Great Pacific Garbage Patch, The Ocean Cleanup, 2020. https://theoceancleanup.com/. Accessed 29 November 2020.

CLOUD MATERIALITIES

Qianyu (Sienna) Fang

What we call the 'Cloud' is nothing but a global network of data centers stacked with computer servers online performing and providing services. As a result, Cloud computing software and technologies are being constantly developed and deployed. Despite the energy and resource-intensiveness of Cloud computational processes digital manufacturers often present Cloud technologies as immaterial and without impacts. While they attract users with their accessible and user-friendly interfaces, the materialities that drive the Cloud are conveniently concealed away. One cannot be sure how many of 3.6 billion Cloud-based service users understand the material facts obscured by the so-called Cloud.

My art installation examines the materialities of the Cloud. It is based on the premise that the material infrastructures that contribute to the Cloud is not widely known. By constructing a speculative and interactive user interface I consider the various material aspects of the Cloud, and systematically guide the user to understand it step by step. As an alternative to the cool interfaces and advanced technologies the Cloud involves, my interface provides a low-tech style with pixel-based images and icons. The main page showcases a graphical Cloud that serves as an entrance along with an instruction – "What is this". Various icons represent critical themes (presented below), leading to texts that describe the material affordances of the Cloud.

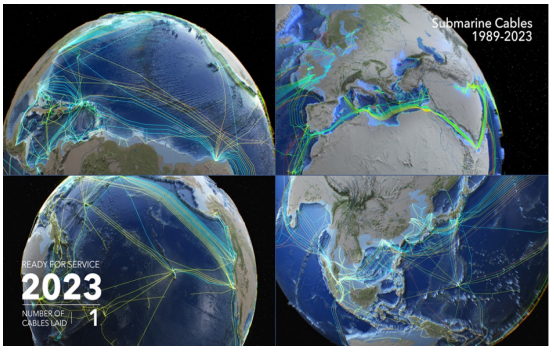

Figure 3.1 Submarine Cables in 2023 (Photo credits: Wired World)

Cloud and Undersea Cables

Cloud storage has increased the needs of global undersea cable infrastructure. The complicated and hierarchical relationship between Cloud and undersea cables can be described as below: Technically, humans encode themselves in lights, lights hide inside fibers, and those fibers are surrounded by tubes. The internet is made up of tubes all over the world. Our life is surrounded by electronic tubes: every browse on the internet needs to go through tubes; every building is filled with tubes; over two hundred submarine cables were buried across the ocean floor. Using a Cloud based service is basically tube traveling: undersea cables carry users' data and send them to servers and carry request data from server to users again. Users might not consider the spatial fact of one single click [1].

Figure 3.2 Global networks of fibre-optic cables lie underneath the world's oceans. (Photo credits: The Independent, 2015)

Vulnerability - Human Factors

The vulnerability of physical components might threaten the stability of the Cloud. For the undersea cable infrastructure, human incidents, like an errant anchor and shipping incidents, is one of the major factors that disrupt the internet connection. Once the connection is broken, a telecommunication outage is unavoidable. Besides, unlike the part where most submarine cables are buried under the sea, there are other infrastructures of the Cloud that are easier to attack or destroy. Cable landing stations, for example, can be easily attacked because they are usually above ground thus highly visible. Any single landing that connects to a domestic terrestrial cable infrastructure at least serves several undersea cables. If one station is attacked, multiple wires can be interrupted. A car incident and a small explosion might be fatal to those infrastructures [2].

Elements within The Earth

Considering the Cloud as a metaphor obscures the material backbone of our digital technologies. Cloud-based digital products usually consist of mined minerals from all over the world. Mining is often embroiled in unethical practices and also produces toxic by-products. Incorporating and understanding the digital Cloud's materialism helps to explain its "virtual" properties [3].

Figure 3.3 Mountain Pass mine in California. (Photo credits: David Becker/ Reuters)

Rare Earth Elements Mining

Rare Earth Elements (REE) are crucial ingredients in Cloud technology and associated technologies. Demand for these minerals has been growing since new technologies are often rendered obsolete, and manufacturers tend to withdraw support to their old products. The current use of REE produces a significant amount of toxic pollution by their energy-intensive processes. This pumps carbon dioxide emissions into the atmosphere and buries toxins into the earth. It is especially harmful to developing countries. 23% of deaths in the developing world are attributable to environmental factors [4].

Figure 3.4 A worker at a rare earth elements (REE) mine at Nancheng county, Jiangxi province, China. (Photo credits: Reuters)

Cloud and Anthropocene

Cloud technology as a human activity contributes to the new geological era: the Anthropocene, which is a geological epoch dating from the commencement of significant human impact on earth's geology and ecosystems. The expanding digital Cloud requires expenditure of primary energy. It is not only the basic infrastructure of supporting industrial metabolism but also is the first-rate consumer of resources. Through the unavoidable relationship of the digital Cloud with the physical world and actual energy and material cycles, digital communication has become tightly related to the current dynamics of the wear and tear of earthly resources. The computational infrastructure can only exist with the prior transformation of matter... and energy [5].

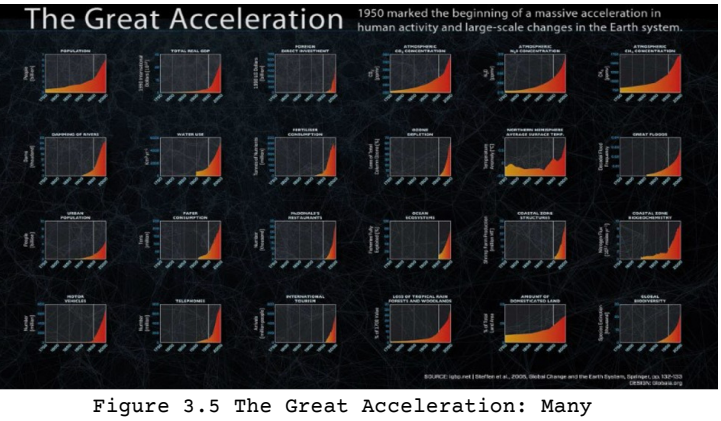

Figure 3.5 The Great Acceleration: Many socio-economic and Earth-systemic indicators show a steep upward trend after 1950. (Photo credits:IGBP, Globaia)

Rare Earth Elements Mining

Rare Earth Elements (REE) are crucial ingredients in Cloud technology and associated technologies. Demand for these minerals has been growing since new technologies are often rendered obsolete, and manufacturers tend to withdraw support to their old products. The current use of REE produces a significant amount of toxic pollution by their energy-intensive processes. This pumps carbon dioxide emissions into the atmosphere and buries toxins into the earth. It is especially harmful to developing countries. 23% of deaths in the developing world are attributable to environmental factors [4].

Figure 3.6 Figure 3.6. Plastic and other waste emerge as a human-made Anthropocene sediment. (Photo credits: Antoine Giret/Unsplash)

Notes

1. Hantover, Lixian L. The Cloud and The Deep Sea: How Cloud Storage Raises the Stakes for Undersea Cable Security And Liability. 19Ocean & Coastal L.J, 2014.

2. Peterson, A. “Everything you need to know about the vast undersea network that makes the Internet work.” The Independent, 2015. https://www.independent.co.uk/life-style/gadgets-and-tech/everything-you-need-know-about-undersea-cables-power-your-internet-and-why-they-re-risk-breaking-a6710581.html. Accessed 7 December 2020.

3. Rosol, C., Steininger, B., Renn, J., & Schlögl, R. “On the age of computation in the epoch of humankind.” Nature.com. https://www.nature.com/articles/d42473-018-00286-8. Accessed 7 December 2020.

4. Heikkurinen, P., Valtonen, A., & Ruuska, T. After the Anthropocene. Mdpi AG, 2020.

5. Reading Anna and Tanya Notley. The Materiality of Globital memory: Bringing the Cloud to Earth, Continuum, 29:4 (2015), 511-521, DOI: 10.1080/10304312.2015.1051807

6. Sheibani, A. “Rare earth metals: tech manufacturers must think again, and so must users.” The Guardian, 2014. https://www.theguardian.com/sustainable-business/rare-earth-metals-upgrade-recycle-ethical-china. Accessed 7 December 2020.

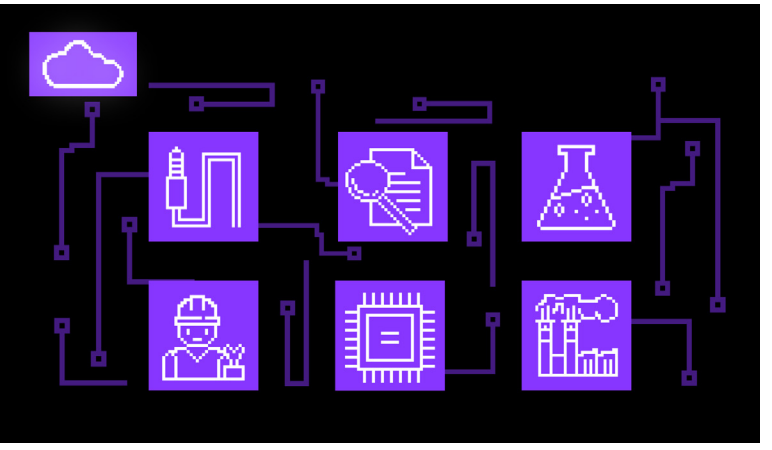

Figure 3.7
Installation Screen

Figure 3.9
Installation Screen

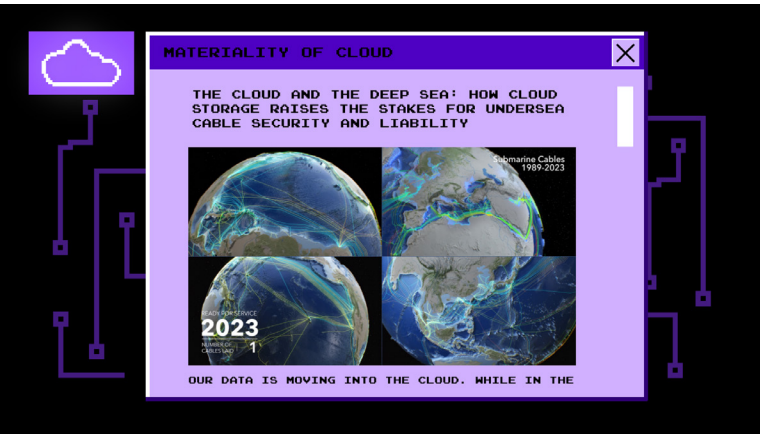

Figure 3.8
Installation View

UNTITLED

Oskar Koli

Figure 4.1 Artwork Close-up

Fossil fuels have been a driving force in shaping the world we live in. Every aspect of our lives is somehow connected to them. The plastic in our electronics, the electricity enabling our media, the gas in our vehicles. They all cut away at this non-renewable resource. And yet, they remain an abstract concept to the vast majority of us. We all know what fossil fuels are and what they are used for, but most have never witnessed them first-hand. Who among us has seen that glossy thick liquid we call crude oil? How many have had their fingers smeared by the black dust of coal mined from the Earth? It is this contradiction that resulted in the making of this sculpture.

The sculpture features a chunk of coal brushed by a feather, enclosed inside a bell jar. The feather moves slowly, almost sensually, across the black surface of the sedimentary rock, each swipe removing an indistinguishable amount of particles from the surface of the coal. Some particles grab onto the white feather, staining it gray, while others fall to gradually carpet the base of the sculpture with a thin black layer of dust. The movement of the feather is powered by a motor and controlled by a microcontroller.

I see the work as having multiple possible meanings. And, so I left the piece untitled, preferring not to dictate how the viewer experiences it. One might understand it conceptually; seeing it as the media we consume, in the form of the microcontroller and the motor, slowly depleting a precious resource. Or one might experience it materially, focus on witnessing the white feather contrast with the harsh, black surface of the coal. Either way, the piece brings into focus something most have never seen in person.

Figure 4.1 Artwork “Untitled”

THE ACOUSTICS OF POLLUTION

Anze Bratus

The Acoustics of Pollution is an audio-video installation, focusing on the topic of the Anthropocene – the never-ending impacts of humanity on the environment. The piece uses the technique of data sonification. It processes pollution data to drive various sound envelopes to create a generative and evolving soundscape. The installation highlights how pollution levels exponentially increase while at the same time damaging the environment. The work mirrors an ominous state of affairs on our planet

Pollution and environmental damage can be traced back to the previous centuries to the Industrial Revolution that took place between 1760 to 1840. This era of mechanization transitioned production from hand-produced goods to mechanized factory processes using machine tools. At the same time, chemical manufacturing and iron and steel production lead to considerable changes in the manufacturing processes with steam power as it's the most effective tool. The Industrial Revolution also increased the rate of consumption and brought about an unprecedented rise in the rate of population growth. All of that wouldn't be possible without the growing abundance of fossil fuels, that are today still extensively used around the world as the main source of energy [1].

Figure 5.1 Pittsburgh, Pennsylvania, 1890s (Source: Bettmann/CORBIS [2])

While fossil fuels play a dominant role in global energy systems and have been a fundamental driver of technological, social, economic, and development progress for centuries, they have also resulted in negative impacts on our environment. When burned, fossil fuels are the largest cause of global climate change, producing substantial amounts of carbon dioxide (CO_2) and massively contributing to the local air pollution.Although Europe is aiming towards the use of low-carbon sources of energy via nuclear power and renewable energy, the annual CO_2 emissions are steadily increasing in other parts of the world.

To address this dilemma, I use pollution emissions data to construct a soundscape installation incorporating a video that visualizes the annual CO2 emissions in the past 200 years [2][3].

The soundscape features both organic and synthesized sounds, that are mixed and manipulated by envelopes and different effects. In sound and music an envelope describes how a certain sound or sound wave changes over a period time. The majority of the soundscape is synthesized in Max MSP, using Max for Live to apply different effects to the synthesized sounds [7]. The soundscape is mixed and mastered in the 5th order of ambisonics, the 360 full-sphere surround sound technique and binnauralised so it can be played and enjoyed by using any pair of headphones. Using ambisonics allowed me to fully immerse the viewer/listener into the soundscape, using various panning techniques that makes the sound textures flow around the listener.

The supporting visuals present a graph of the annual CO2 emissions in all five major continents, courtesy of Our World in Data, that features a wide variety of datasets about our planet and humanity [1]. The video patch made with Max Jitter, uses various arithmetic operators and digital glitching to randomly blend the video of a 2D line graph with videos of fossil fuel pollution and smog, as a visual manifestation to the soundscape [4][5][6]. The x-axis of the graph displays the year, while the y-axis shows the amount of CO2 emission in tons.

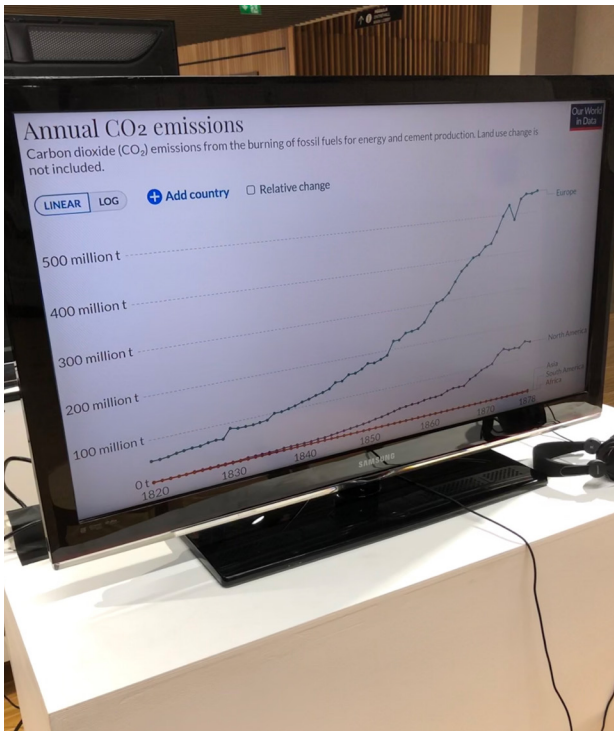

Figure 5.2 Installation view

Notes

1. Brown, Cynthia. “The Industrial Revolution.” Khan Academy, last modified 2016, www.khanacademy.org/humanities/big-history-project/acceleration/bhp-acceleration/a/the-industrial-revolution.
2. Ritchie, Hannah, and Max Roser. “Fossil Fuels.” Our World in Data, last modified 2 Oct. 2017, https:// ourworldindata.org/fossil-fuels.
3. Bradley, Robert L. “The Growing Abundance of Fossil Fuels: Robert L. Bradley Jr.” FEE Freeman Article, Foundation for Economic Education, 1 Nov. 1999, fee.org/articles/the-growing-abundance-of-fossil-fuels/.
4. Kelly Lacy. “Thick Smoke Coming out of the Chimney in a Manufacturing Plant.” Pexels video. Uploaded May 15, 2020. https://www.pexels.com/video/thick-smoke-coming-out-of-the-chimney-in-a-manufacturing-plant-4404144/
5. Fisk, Tom. “Drone Shot of Smoke Coming from Smokestack of an Industrial Building.” Pexels video. Uploaded on July 16, 2020. https://www.pexels.com/video/drone-shot-of-smoke-coming-from-smokestack-of-an-industrial-building-4884642/
6. Pasaric, Aleksandar. “View of Buildings In A Foggy Atmosphere.” Pexels video. Uploaded on January 20, 2019, https://www.pexels.com/video/view-of-buildings-in-a-foggy-atmosphere-1817871/
7. Max MSP is a visual programming language by a company Cycling ‘74; Max for Live is an to connect Max MSP to Ableton Live workstation.

STUDIES ON INVISIBILITY

Tuula Vehanen

Today, devices that produce radio frequency radiation are widely distributed in our living environment. These include radiation emitted by cellphones, microwaves, wireless internet, radars, and TV broadcasts that are based on radio waves. Under typical conditions, the greatest exposure to radio frequency radiation is caused by devices that are held near the body, such as mobile phones and other wireless terminals. Exposure from transmitters further away from humans, such as mobile base stations or broadcast transmitters are typically thousands of times lower. There is no conclusive scientific evidence on the health effects of long-term exposure. Conflicting information about the effects of radio frequency radiation on humans, animals and our environment are widespread. A number of studies confirm that radiation is harmless, while others show massive effects on both humans and animals, weather observation, and space research [1], [2], [3], [4], [5], [6]. No single radio equipment -if used and installed correctly- will cause transboundary exposure [7], [8]. But what are the combined effects of all devices, i.e. the total exposure when the number of different sources in our habitats could be extensive and pervasive?

Figure 6.1 Cafe Carusel 80 000 µW m2

Studies on the effects of radiation are contradictory [1], [2], [3], [4], [5], [6]. These results show that there is no reason to suspect that radiation has adverse health effects based on research data. It has been emphasized that the radiation levels in Finland are within the recommended values and that the thermal effects of radiation are small and not dangerous to humans. On the other hand, for example, the World Health Organisation's Cancer Research Institute (IARC) classified radio frequency radiation as potentially carcinogenic in 2011 (Group 2B) [3]. The classification covers radiation from smartphones, WiFi and mobile phone base stations, among others (IARC 2011). In the same carcinogenicity group as radio frequency radiation are, for example, lead, DDT and petrol engine exhaust [3].

The long-term health effects are still speculative but there are already indications of the effects of radiation on oxidative stress, fertility, cardiovascular and hormonal function, ability to concentrate, sleep quality, headache, hyperactivity, unusual tiredness, etc. The standard limit of 3 V / m (24,000 µW / m2) for medical devices (eg pacemakers) is easily exceeded in the vicinity of base stations and in places where radiation is emitted from several sources. Schools, kindergartens and nursing homes are also places where the RF frequency exposure should not exceed 100 µW / m2 = 0.2 V / m. Rarely is a user exposed to as many radiation sources simultaneously near a cellphone base station as in a classroom where each student is connected to a WLAN (Wireless Local Area Network). Studies show that mold, chemical and heavy metal exposures increase the effects of radiation [4].

In France, WLAN routers have been banned since the beginning of 2015 in kindergartens and schools. They must be switched off when not in active use. Many other countries have also called for restrictions on the use of WLANs, as well as on the use of mobile phones in schools.

Overall, electromagnetic exposure, such as radio frequency radiation from mobile phone base stations, has been found to have detrimental effects on a variety of organisms, from vertebrates to invertebrates and from plants to bacteria. 5G base stations are a particular threat to bees and other pollinators, as well as to the navigation systems of migratory birds and other animal species. Weather observation is believed to be disrupted because radiation from wireless technology interferes with satellite moisture measurements. 5G satellites interfere with the practice of astronomy as well as the risk of satellite collisions and space debris increases. In addition, 5G is much more vulnerable to hacking than previous technologies, which poses serious threats to security and therefore functioning of society.

The 5G network operates at shorter wavelengths than previous networks, as such its operating range is narrower and is poorly permeable to e.g. walls. The emerging 5G networks demand an increased deployment of base stations.. This development is indeed influenced by IoT, ie the networking of objects on the Internet. In a sparsely populated area, on the other hand, the signal must be considerably stronger to serve remote users. A new feature of 5G technology compared to previous technologies is that one single base station can have hundreds of antennas whose beams can be aligned like a laser [3].

A 5G base station is generally expected to consume roughly three times more energy than a 4G base station, and more 5G base stations are needed to cover the same area [3], [5]. In several countries, efforts have been made to slow down the construction of the 5G network before we have more detailed research on its effects on people and our living environment. The installation of the 5G network has been restricted due to reservations, at least in Brussels, Switzerland, Italy and the USA. Many countries and European cities comply with the precautionary limits on radio frequency emissions. They are much stricter than the Finnish radiation limit values.

Figure 6.2 Eino Leino 100 000 µW m2

In my photography I attempt to render radio frequency radiation visible (see Figure 6.1. and 6.2.). For this, I have limited the frequency of the radiation to human-produced radiation (geological radiation, infrared or ultraviolet radiation, are not taken into account). The amounts of radiation vary locally and increase momentarily, for example during events. The values I have utilized are based on a study that mapped several locations in the center of Helsinki where considerable amounts of radiation have been detected [6]. As a unit of measurement I have taken into account the maximum outdoors recommendation value by the researchers in a wideBioInitiative 2007 report : limit value of 1 000 µW / m2 [9]. Every wave in the images represents a single recommended maximum unit of radiation (1,000 µW / m2). 1 wave = 1,000 µW / m2. The waves are not intended to describe the actual wavelengths or directions of the radiation but to indicate the amount of verified radiation at each location. The amounts of radiation are averages measured at the specific location.

Notes

1. Ohjeellinen käytännön opas direktiivin 2006/25/EY täytäntöönpanoa varten (Keinotekoinen optinen säteily), ISBN 978-92-79-19809-0, doi:10.2767/3059 Euroopan unioni, 2011.
2. 5G-verkon säteilyturvallisuus, Stuk, updated 4.6.2020. https://www.stuk.fi/aiheet/matkapuhelimet-ja-tukiasemat/matkapuhelinverkko/5g-verkon-sateilyturvallisuus
3. 10 syytä, miksi 5G on todella huono idea, published 1st Jan, 2020, updated 3.4.2020. https://sateileeko.wordpress.com/2020/01/01/10-syyta-miksi-5g-on-todella-huono-idea/
4. WLAN – Terveysriski koulussa ja unettomuuden syy kotona? updated 26.9.2020. https://puheenvuoro.uusisuomi.fi/mikkoahonen/98163-wlan-terveysriski-koulussa-ja-unettomuuden-syy-kotona/
5. 5G's Waveform Is a Battery Vampire, published 24 Jul 2019. https://spectrum.ieee.org/telecom/wireless/5gs-waveform-is-a-battery-vampire
6. Rajua tukiasemasäteilyä Helsingin keskustassa, published 11th, Aug, 2019; https://sateileeko.wordpress.com/2019/08/11/rajua-tukiasemasateilya-helsingin-keskustassa/ß
7. Säteilyn vaikutuksia ei oteta vielä vakavasti, May 12th, 2014, FT Mikko Ahonen, University of Tampere. https://aikalainen.uta.fi/2014/05/12/sateilyn-vaikutuksia-ei-oteta-viela-vakavasti/
8. Kirjallinen kysymys KK 367/2016 vp, Kirjallinen kysymys matkaviestinverkon tukiasema-asennusten viranomaisohjeistuksen ajantasaistamisestaviranomaisohjeistuksen ajantasaistamisesta/Eeva-JohannaEloranta sd, Eduskunta Riksdagen, 22.6.2016. https://www.eduskunta.fi/FI/vaski/Kysymys/Sivut/KK_367+2016.aspx
9. Henry Lai's Research Summaries, Bioinitiative 2012, updated 2014 and 2017. https://bioinitiative.org/research-summaries/

RESTLESS BODIES

Dominik Fleischmann

Technology runs on pureness and perfection, but just like us, it's born from dirt. For a feeble and imperfect species such as ours, this desire for purity is understandable. The accelerating climate crisis and decline of flora and fauna that comes with this quest for pureness seems contradictory. But even if all goes down to waste, there are still other planets that can be colonized, right?[1] Even in our most pretentious moments, we are very aware of our flaws. That's why we had to invent perfect media to make up for our imperfect minds.

One essential element needed for all kinds of technologies, from communication to power transmission is copper. After copper sulfide is mined, crushed, and ground, a compound containing 25% copper remains as residue. Useless in the eyes of technology. Only after heavy treatment with thermal techniques a 99% copper substance can be extracted. Still pathetic in the realm of purity. Another stage of electrolytic refining is needed to generate 99.99 % pure copper. Perfection at last. All that is needed for the blessing of ten pounds of pure copper is the vanity of one ton of ore and a trail of pollution guarding every step of the way [2].

If we ignore the exploitation of land and labor then the purity of technology is truly fascinating. However, humanity itself doesn't run on perfection. We strive with defects and diversity just like every other being and ecosystem. The things we create are bound to fail and we are bound to fix them, at least as long as we are stuck with our own waste on this planet.

The use of old technology to create new devices from parts of various media is a rather small trend in tech but with roots as old as life itself. The outcomes of the art of exploring, manipulating, and circuit bending second-hand media could just be called adaptation or repurposing, but some people thought that calling it Zombie Media would be much cooler [3]. They were right. Folks like these who come up with fresh terms and solutions for the mountains of man-made trash (instead of burying it into new shiny garbage) give me hope. (On the days when I don't feel hopeful, and after reading too many papers on media and the environment, I write angry poems on broken photographs.)

We love purity. But purity is not us. For the world to function we need to embrace our impurities. The human body itself is not pure. We're not even close to being purely human. Human cells make up less than fifty percent of our body's total cell count [4]. Bacteria, viruses, fungi, and archaea make us whole.We can't deny our shared ancestry with the earliest life forms and we are lucky that they never abandoned us. It's still not entirely clear what part they played in the evolution of humankind and where this shared journey will lead to remains unforeseeable.

Who knows, maybe one day we will really abandon our own planet and our multi-species organisms will venture into space to take part in a multi-planetary obscenery.

For this is who we are. A wild mix of human and non-human DNA, restless bodies with a love for purity, tools, and technology. Hopeless feral creatures with zombie media hearts.

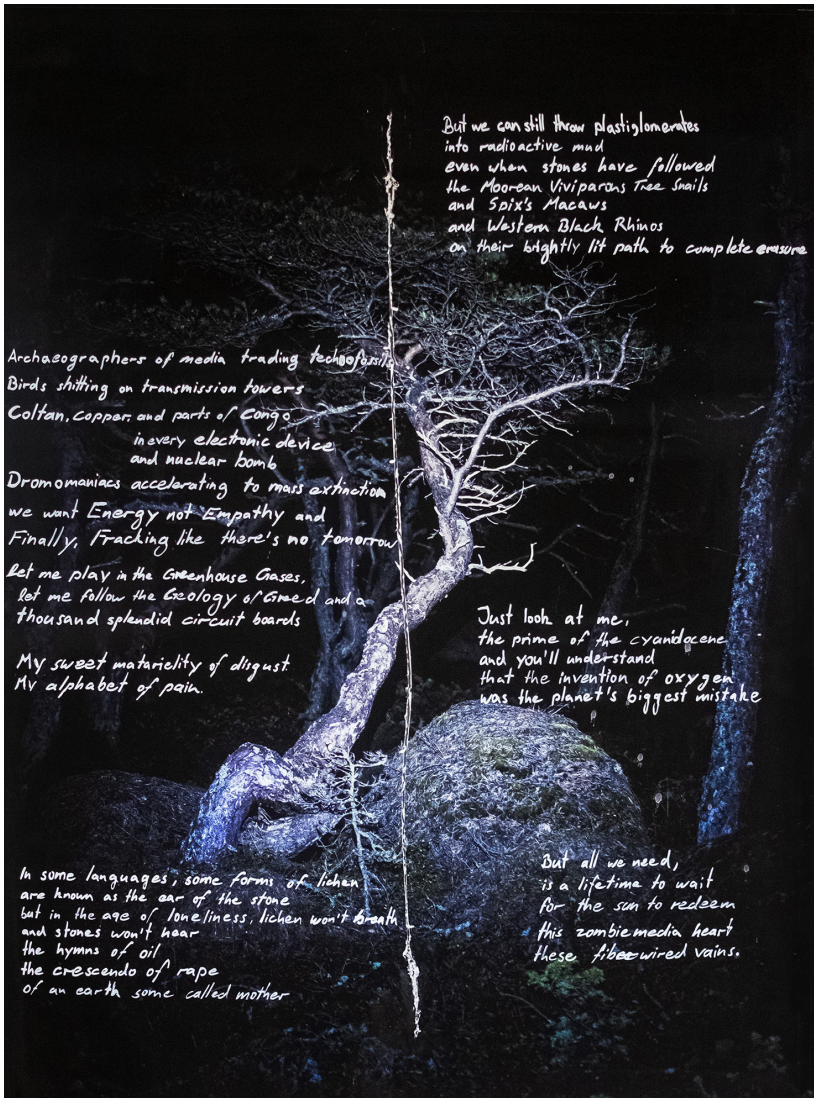

Figure 7.1 Artwork

Notes

1. Musk, Elon. Making Humans a Multi-Planetary Species. (New Space Vol. 5, No. 2, 2017: 46-47).
2. Starosielski, Nicole. "Thermocultures of Geological Media." Cultural Politics 12(3): 296-98 (Duke University Press, 2016).
3. Hertz Garnet and Jussi Parikka. "Zombie Media: Circuit Bending Media Archaeology into an Art Method" Leonardo 45 (5): 424-430, (MIT Press, 2012).
4. James Gallagher, BBC News 2018: www.bbc.com/news/health-43674270

TOWARDS POSTHUMANIST PHILOSOPHY OF PERFORMANCE

Mirya Nezvitskaya

Performance art might have its origins in the Paleolithic age when our ancestors performed sacred rituals to emulate the spirit world. It is quite burdensome to trace the exact date of birth of performance art, as in its essence it is a pure transmission of energy between the artist and the audience at a particular time and space. In other words, it takes place in the present. Once the piece is over, it ends. It is only the memory of it that lingers. But, with the birth of media technologies, in particular the development of the first film camera in the late nineteenth century, performances could be captured, stored, documented and reused. Thus, memories could be saved forever.

With the advancement of media, plastics became an essential enabler of its development. The discovery and refinement of nitrocelluloid [1] enabled the first transparent and flexible film base material to be produced. For both photographic and cinematic images nitrate film was widely used until mid-twentieth century [2]. Polymers like cellulose nitrate, cellulose acetate and polyester play an important role in film history as well as in the making and documenting of performance art. Nowadays, digital media is the primary medium used in performance art: from digital camera to mixed reality, where the viewer can almost be present with the artist in the same space and experience the performance. The feeling of the immateriality of digital media is only on its surface, according to Taffel “plastics are often neglected within materialist accounts of media” [3]. What are the connections between plastics and performance, media and materiality? In the sections that follow I discuss the various views of materialist theories as pertaining to plastics and performance, media and materiality. I debate that a posthumanist perspective is essential to the development of performance art in a media and plastic saturated world and as well raise awareness through performance of environmental degradation.

Materialism assumes that all the things in the world are tied to physical processes and matter [4].

Figure 8.1 "Collecting your Waste" performance

However, within digital media, the understanding of what is material and what is not is still debated. In 1985 the Centre Pompidou opened an exhibition curated by Jean-François Lyotard, which questioned how telecommunication technologies were beginning to impact every aspect of life [5]. The title of the exhibition was "les Immatériaux / The Immaterials". As Hui explains "the title might foster the misleading impression that Lyotard understood the digital as immaterial; on the contrary, the immaterial, to Lyotard, is fundamentally material" [6]. According to Hui the title was "strategically chosen in order to disrupt the modern concept of matter. According to Lyotard, the immaterial designates a new material, which could not and should not be the continuation of the traditional concept of matter" [7].

This brings us to New Materialism, that has been developed at the border between philosophy and media ecology. It advocates for a post-cartesian and posthumanist perspective [8]. According to Parikka, "new materialism is not only about intensities of bodies and their capacities such as voice or dance, of movement and relationality, of ontological monism and alternative epistemologies of generative matter, but it is already present in the way technical media transmits and processes ''culture,'' and engages in its own version of the continuum of nature-culture (to use Donna Haraway's term) or in this case, medianatures" [9]. New materialism is a radical philosophical turn after Foucault's "death of man" [10].

Figure 8.2 “Collecting your Waste” performance

The posthumanist discourse goes beyond new materialism and questions the boundaries of the human understanding. According to Ferrando “posthumanism is the philosophy of our time. “Posthuman” has become a key concept in the contemporary academic debate, to cope with the urgency for an integral redefinition of the notion of the human, following the onto-epistemological, as well as scientific and bio-technological developments, of the twentieth and twenty-first centuries” [11]. Ferrando continues, that “the environmental turn, more than evoking an essentialisation of the Earth, liquefies the relation between the Earth and the human; symbolically and materially, the Earth may turn into Gaia, the ancestral mother of all life; the human may acknowledge themselves as compost (Haraway), eventually turning into humus, nourishing the Earth” [12].

Ferrando’s work takes into consideration posthuman ontology as non-anthropocentric celebration of life. Non-anthopocentric view in digital media, environment and performance is an essential discourse in discussion of the philosophy of the Anthropocene. Posthumanism may bring the ontological question of what performance is, how to document the materiality and the process of it and human and non-human actors.

Performance is a process; it is embodied and embedded, materialist and vitalist. A posthumanist view of performance is connected to different processes, entities and machines that contribute to the material and vitalist elements of the performance. Media technology plays a key role in exhibiting and documenting ephemeral art. Even though, digital is quite often mistaken as immaterial, it is, in fact, quite the contrary, “there is a need for a cultural analysis of dirty matter; the materiality of waste is one concrete way to think about new materialism” as Parikka states [13].

Figure 8.3 "Collecting your Waste" installation

Collecting Your Waste

For my performance installation Collecting Your Waste, I wished to combine the research of materiality, posthumanist philosophy of performance with my artistic practice. Over the course of a week, I asked four participants to collect their plastic waste that they could not recycle. These plastics went into the creation of the performance and aesthetic pieces of the installation. By this, I question and critique single-use materials frequently used by artists, including myself. Overall, the performance questions the treatment of the Earth during the postcolonial industrialization era, in particular the excavation and limitation of available natural resources and accumulation of plastic objects in the Earth's environment.

Notes

1. Taffel, Sy. "Technofossils of the Anthropocene: Media, Geology, and Plastics", Cultural Politics, 12 (2016): 358.
2. Taffel, Technofossils of the Anthropocene, 358.
3. Taffel, Technofossils of the Anthropocene, 367.
4. Philips, Michael. "What is Materialism?", Philosophy Now. https://philosophynow.org/issues/42/What_is_Materialism. Accessed December 3, 2020.
5. Hui, Yuk. "Towards a relational materialism: a reflection on language, relations and the digital", Digital Culture and Society, 1(1) (2015): 131.
6. Hui, Towards a relational materialism, 131.
7. Hui, Towards a relational materialism, 132.
8. Bennett, Jane. "Vibrant Matter: A Political Ecology of Things" (Durham, NC: Duke University Press, 2009), 62–81.
9. Parikka, Jussi. "New Materialism as Media Theory: Medianatures and Dirty Matter", Communication and Critical/Cultural Studies, 9:1 (2012): 95–100.
10. Downing, Lisa. "Works: The death of man. Cambridge Introduction to Michel Foucault" (Cambridge: Cambridge University Press, 2008), 38–52.
11. Ferrando, Francesca. Philosophical Posthumanism (Bloomsbury Academic: Bloomsbury Publishing, 2019), 1.
12. Ferrando, Philosophical Posthumanism,107.
13. Parikka, Jussi. "New Materialism as Media Theory: Medianatures and Dirty Matter", Communication and Critical/Cultural Studies, 9:1 (2012): 95–100.

INFRAGRAPHY

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VOLUME IV

Infragraphy Vol. 4 is a compilation of critical student artworks and short essays dealing with the materialities of media technologies and their environmental implications. These works and texts are the outcomes from the 'Media and the Environment' Master of Arts course in the Fall of 2020 at the Department of Media, Aalto University School of Arts, Architecture & Design, Finland. The course examined the themes of Anthropocene, Thermocultures, Fabrication, Plastics, Internet of Things, Planned Obsolescence, E-waste, and Media's energetic landscapes. It introduced artistic methods and practices that could address emerging media materialities. The final exhibition of the course was a collection of student artworks as a response to the contemporary discourse of political economy of media and related environmental implications.

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