infra_graphy

Volume 1 _
Spring 2019

Aalto University

Printed in Print Lab, Aalto University, School of Arts, Design and Architecture, Finland.

Aalto University

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intro_ duction

-graphy, -graphia or -graphein as suffixes convey a process of writing, recording or inscribing. 'Infragraphy' thus denotes the description or study of the process of inscribing infrastructures. More specifically in context of media studies it pertains to the multifarious ways in which media and media infrastructures have been or are being inscribed on the geological strata of the earth and as well on our bodies. Therefore, Media Infragraphy becomes a method to seek, identify, strain, unfold and disentangle media and its infrastructures to attempt an understanding of how they operate and affect. Furthermore, a -graphia of infrastructure allows us to construct methodologies to comprehend the impacts on humanity and the environment.

This first volume is a compilation of critical student writings and photo essays about media, infrastructure and the environment. These texts are outcomes from the course "Archaeology of Media Infrastructures" in the Spring of 2019 at the Department of Media, Aalto University. The course was a series of scholarly readings about and around media infrastructures including Deep Time, materialities of the Internet, Artificial Intelligence, digital labor, Water and Energy, and critical infrastructure. These readings were followed upon with intense classroom discussions and debates, some of which may have seeped through to these following texts.

The volume begins with Leo Kosola's *Walking in the Tank* that is part memoir and part reportage. Kosola examines the global laying of submarine data cables through his own personal experience aboard a cable-laying ship. Kosola's real-life account is followed by Auri Mäkelä's *When Dust is Spice* that explores the futuristic ecology of Frank Herbert's Dune. Mäkelä draws parallels between the ecology of the desert planet Arrakis and its "smart dust" Spice, along with cognitive capitalism. Reishabh Kailey's *Infrastructures of Social Oppression* argues how people belonging to certain oppressed groups occupy an infrastructural role in society. Emil Lyytikkä's *The City as Facilitator*, speculates whether maintenance of infrastructure could be an enriching partnership between the city and its residents. In *Encounters of Animals and Media Infrastructure* Eerika Jalasaho following the footsteps of Lisa Parks ponders about the relationships between other species and media infrastructure. After reading Jalasaho's thoughts, we are drawn deep into the world of mining and data centers in Sweden, with Hanna Thenor Årström's critical account: *Dirty Mining and Clean Data in the Swedish Industry*. And, finally we have Lorenzo Marchesi in *The Many Shapes of Olivetti Company* examining the ways in which old media infrastructures meet new technologies, and how they begin to shape each other.

The primary themes that emerge from these texts are those that of entanglements of media and infrastructure, humans and the non-human, city and industry, the present and the future. I am grateful to the students who have earnestly taken upon themselves to read, write and discuss such matters of media infrastructures. I am thankful to Lorenzo Marchesi for the graphic design, Eila Hietanen at the Aalto Print Lab, and the generosity of the Department of Media to provide funds for the printing of 50 copies. I am hoping we will continue with this informal journal every semester to allow for the emergence of critical student voices in the future.

Samir Bhowmik
3 May 2019, Helsinki

Leo Kosola

Walking in the tank

> ***People think that data is in the cloud, but it's not. It's in the ocean.***
>
> *- Jayne Stowell, Google*

About half of the data and telex traffic coming to Finland via Sweden was cut off on Thursday morning. ... Telecommunications was blocked when an underwater optical cable was broken in the harbor area of Stockholm [1].

This event happened in 1992. Telecommunications networks were so fragile that one anchor of a ship could break half of all data traffic to Finland.

The first submarine communications cables were laid on the seabed in the mid-19th century. Hi-speed fiber optic cables were introduced more than a century later and the first trans-Atlantic fiber optic cable was laid in the 1980s. However, it was thought that primary way to transmit data would eventually be satellites. But fiber optic cables were so functional that remote satellites couldn't challenge cable technique [2].

Cables are traditionally owned by consortiums of different telecom carriers. Some cables are also owned by private companies who sell capacity to whoever needs it. In recent years, content providers such as Google, Facebook, Amazon and Microsoft who use massive amount of data have started investing in cable infrastructures [3]. Especially, Google is taking lead in developing its own cable infrastructure.

Demand for undersea cables will only grow as more businesses rely on cloud computing services. And technology expected around the corner, like more powerful artificial intelligence and driverless cars, will all require fast data speeds as well [4].

As the World Wide Web turns 30, media has actively enlightened how web and internet infrastructure actually work. I understand the need for that. For example, I use unlimited amount of data on my phone per month, read future visions where cars are connected to the internet by radio waves and how they drive independently with artificial intelligence. I tend to forget these magical wireless techniques are transmitted through mundane and yet critical wired infrastructure, a tiny portion of which I have myself participated in building during my time in the Finnish Defense Forces.

In 2010, for 6 months, I served my time in the Navy in a unique vessel: the cable-laying ship Putsaari. Built in 1966, it is the first cable-laying ship in the Finnish navy. As a seaman I was the lowest in hierarchy accompanied by 8 other seamen. Cable technicians and engineers were also part of the ship's permanent staff among the total crew of twenty on board the ship.

We worked around the Baltic Sea from April to October; when the ice was melting through the unusually warm summer until the autumn storms. While most ships in the navy had no point leaving the port (because it was peacetime, luckily) we were working most of the time. It was both rewarding and exhausting. We experienced spectacular archipelago and sea views – and we saw, felt and smelled hundreds if not thousands of kilometers of cable.

Our core working place was a cable tank, a cylinder-shaped container where cable is loaded. Unlike one would think, cable loading doesn't happen automatically. It needs a worker in the tank to "coil", lay out cable in a spiral shape, layer by layer. A person laying out cable is followed by another member of the crew who makes sure that the cable remains in place. If the cable causes trouble, he is responsible to fix the problem. The job was done in shifts, 30-45 minutes at once in the tank, and switch of shifts was done on the fly with no pauses.

Figure 1. *Men working in a cable tank of small cable-laying ship Telepaatti in the 70s. Image Credits: Seppo Gröhn/Jussi Ihander, Telen ja Soneran henkilökunnan kuvia, 1970s.*

To optimize the load, we often took as much cable as the tank was able to hold, so at the end of the loading, it was impossible to stand in between the high cable pile and the roof. Putsaari's cable tank, if I remember correctly, could fit 60 kilometers of fiber optic cable, which means we walked a lot in the tank when we loaded. (Too bad smart phones with step calculators were not yet popular in those days.) But it was still rather fast operation, like a day or two, unlike in large cable ships that can load cable for four weeks [4].

We also worked with the old cable which was broken or outdated. We dragged it out from the seabed by dropping a hook to the sea and then reversed the ship over the location where the cable was supposed to be. The old cable was smelly, slimy, muddy and sometimes wonky, and it was always a mess to get it properly back into the cable tank.

The reason why we worked so hard that summer (we were told), was because we were the last Putsaari crew before the old vessel was sent for demolition.

There is already more than a million kilometers of cable on the seabed and new cables are being laid all the time [3]. I would like to know how is the life of an average cable layer on bigger ships that lay thousands of miles of cables on the oceans. What we have heard from factories and mines related to digital media production chains, I wouldn't be surprised that also marine cable operations have their dark side of exploiting labor. Sadly, all media coverage I found seem to be more excited to interview captains and engineers than labor (cable-laying crew), and being amazed that internet data is not in the cloud but in the ocean.

But! I found something else that made me feel good. As I write this text I tried to find images of Putsaari. I found that the ship was not wrecked after all: a private owner acquired the ship and it still exists and sails occasionally. It even has its own Facebook page.

Based on Facebook updates, the new owner of the ship respects the legacy of the ship.

Update on 2 June 2018:
"First gig done. Bow towards home. The cable was laid and Isokari (an island) joined the mainland's network after months-long break. Feeling glad." [5]

Figure 2. *Putsaari at the port of Kotka in 2008.*
Image Credits: MPorciusCato, Wikimedia Commons (CC BY-SA 3.0), 2008.

Notes

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[2] Korhonen Johanna Maria, Bittejä Atlantin pohjaliejussa, Helsingin Sanomat, November 10, 1995, https://www.hs.fi/kotimaa/art-2000003197039.html

[3] Submarine Cable Frequently Asked Questions, TeleGeography, 2019, https://www2.telegeography.com/submarine-cable-faqs-frequently-asked-questions

[4] Satariano Adam, How the Internet Travels Across Oceans, New York Times, March 10, 2019, https://www.nytimes.com/interactive/2019/03/10/technology/internet-cables-oceans.html

[5] Kaapelialus Suursaari and Tuomas Honkala, "Ensimmäinen keikka suoritettu. Keula kohti kotia […]", Facebook Post, June 2, 2018, https://www.facebook.com/KaapelialusSuursaari/posts/1680556878688598

Auri Mäkelä

When dust is spice

Over the course of last summer I read one of the most popular science fiction novels: Dune by Frank Herbert. Written in 1965, it has inspired a plethora of other works in the scifi genre. Dune is a quintessential sci-fi novel, and not a flawless one [1]. Herbert focuses heavily on world-building and ecology of imaginary planets, as well as internal soliloquies and emotions. Both of these aspects have been hard to remediate into movie narratives [2], a format which has dominated the attention of audiences in the recent decades.

In the essay Dust and Exhaustion: *The Labor of Media Materialism* (2013) Jussi Parikka briefly mentions Dune, but does not elaborate on the connection of cognitive capitalism and the world created by Herbert [3]. In this brief text I'm drawing parallels between ecology of the desert planet Arrakis and its "smart dust", Spice, along with cognitive capitalism.

Dust, as Parikka points out, "marks the temporality of the matter" and signifies "transformations of solids to ephemeral and back". When it comes to ecology, materials may appear stationary, but are in fact in continuous progress: decaying, eroded, moved by the elements, rock turning into sand over the course of millennia. The narrative of Dune begins when members of the noble family Atreides settle on the planet of Arrakis (also known as Dune), a world of sand– and the sole source of narcotic Spice *Melange* essential to the technology and development of the universe of Dune. The reader soon learns how the ecology and people of Arrakis have been transformed by Spice, but also subjected to effects of exploitation by the families who ruled Arrakis before. Water is scarce and thus sacred on Arrakis, but the dust-like Spice is abundant.

The narrative of Dune is likewise abundant with transformations. Nearly all of the characters experience a transformation from what they used to be into something else, processes provoked by the events around the struggle for control of Spice. In Parikka's words, dust invites us to rethink the binaries of One/many, both singular and individual in its materiality. The transformation from one to many is observed in the prophecy that Fremen–the deeply spiritual people of Arrakis–have of their messianic instructor, *Muad'Dib*. The Spice permeates everything on Arrakis, and even its presence is enough to notice the changes it brings. In real life, abundant dust presents a health hazard. In the world of Dune, the effects of Spice are more neutral. For example, the eyes of those who consume Spice in excess are dyed blue throughout. Spice can also be refined into Water of Life, a lethally poisonous blue liquid only to be used by those who have received the training and position to ingest and transmute it. Through the transmuted Water of Life, Muad'Dib sees the past and the present, achieving a higher state of consciousness. With this knowledge, Muad'Dib rules the universe as its emperor.

The extraction process of Spice is also dangerous – a bit like the extraction of minerals in our world, not without psychosocial effects. Networks of labor relations exist on Arrakis, where the ruling house of the planet provides the machinery to search and collect Spice. However, the sands of Arrakis are also inhabited by sandworms native to the planet. Sandworms and the different stages of its life-cycle are essential for the Spice Melange to form within the sands of Arrakis. Harvesting Spice Melange would also mean to expose oneself not only to intense conditions of a desert environment, but also the threat of becoming swallowed or trampled by a sandworm, also attracted and drawn to it. As the Spice departs Arrakis and is transported into other parts of the universe, the people harvesting it have little knowledge of how it is used and lead a modest life on the desert. Harvesters of Spice are expendable.

Different coalitions have their own ways to use the mind-altering substances. The Bene Gesserit is a matriarchal and ancient order interested in expanding human capabilities when it comes to control and power, as far as hosting an eugenics program; Mentat, a discipline for creating advisors to replace computers ("thinking machines") in a world where they are banned; The Spacing Guild, an organization that discovered ways of "bending space" and making space travel available at speeds faster than light. All of the groups are invested or at least interested in the control of Spice.

Bending space in order to traverse it; accessing a collective consciousness and remembering the past; the prescient abilities to rule wisely; the control of one's own mind and body to become superior in battle; using one's own voice to bend others into their will. The powerful mental abilities presented in the fantasy of Dune are numerous. In *Dust and Exhaustion*, Parikka presents us the thoughts of Franco Berardi about cognitive capitalism and the concept of cognitariat, and the different areas affected by it: body, sexuality, mortality and unconsciousness. All of these areas are utilized, emphasized and controlled in the world of Dune. It could be a (re)vision of how cognitive capitalism plays out, with its workers dulled by a narcotic, leaders drunk with power. All human skills packaged into various schools of thought, but all thoughts bound into the purpose and study of how to control, exploit and prosper.

Just like depressed minds in real life struggle to keep up with digital machinery and capitalism, the human race of Dune struggle with the use of Spice and desire for domination of the universe. Despite the interesting combination of technology, ecology and psychology presented in the book, descriptions of ecological impact of human actions are quite minimal, perhaps easily overlooked in the light of technopositivism of the earlier decades. Nevertheless, technology changes us faster than we are able to adapt, just like Spice changes people on Arrakis. In reality however, there are no miraculous mental powers or a messiah coming to our aid – only the metaphysical horrors and the blaring of our screens.

Notes

[1] As one could expect, a novel written in the 1960s has some issues especially in the way it presents its villains and female characters, but to keep this text concise, I'm not going to write about these topics.

[2] Currently a new attempt at turning Dune into a full-feature movie is underway. The documentary film Jodorowsky's Dune (2013) also reveals a story behind a failed attempt to film it in the 70's.

[3] Jussi Parikka: Dust and Exhaustion: The Labor of Media Materialism (2013)

Reishabh Kailey

Infrastructures of Social Oppression

> ***The historical material record shows that people have not been mere beneficiaries of infrastructures but have actually served as infrastructures themselves. If, for instance, the public water supply does not extend into a particular neighborhood, residents of that neighborhood will often fill up their tanks and buckets within the service zone and tote their water that "last mile" home. People, in other words, do the work of absent pumps and pipes. She draws attention to the 'centrality of biopower and human intellectual labor in our infrastructural constellations - "automated," digital, or otherwise.***
>
> *- Shannon Mattern [1]*

While we can "appreciate the centrality of biopower"[1], critical investigation of this phenomenon reveals a more disturbing picture, one that defines who is considered 'biopower.' More often than not, people belonging to certain oppressed groups occupy a more infrastructural role in society. The history of oppression shows us the certain groups of people are viewed as infrastructure by other people.

For example, slaves were a form of infrastructure for the landowners, just as women are still dehumanized as 'baby-making machines' as a means to further the male line [2].

In the Indian subcontinent, rampant inequality due to economic class, religion, gender and sexuality is exponentially adulterated with the hierarchical structures of the caste system to form a mesh like structure of power.

'Dalit' is a an oversimplified term used for those lying outside the caste system: the untouchables, the non-persons. Some Dalit sub-castes have traditionally occupied the position of sanitation workers and thousands of years of continuous exploitation has made them an almost invisible form of infrastructure in the eyes of the mainstream [3]. It is an eerie picture, of hundreds of thousands of humans swimming in the drains under our cities, diving into manholes without any protective gear, cleaning the shit of upper caste and other privileged folk [4].

Figure 1. *A man indulged in manual scavenging.*
Image Credits: Dalit Network [CC BY-SA 3.0 (https://creativecommons.org/licenses/by-sa/3.0)]

The intersectionality of caste, class and status also determine where and how one interacts with media devices and content. Most labor-intensive jobs in mining, manufacturing, delivery and repair of internet, tv, radio and other communication industries are undertaken by those in lower strata of social structures. A large portion of these workers are in the 'one dollar a day' category and will never be able to afford the same devices or even have access to media content they are intrinsic in producing.

The system codifies the value of individuals, and thus their voices, according to the hierarchical spot they occupy within the structure. This conscious, systemic and insidious social infrastructure enforced for 2000 plus years is used to control whose voices are heard, read or watched.

From Infrastructure to Person

History shows us that oppressed people get liberated only when they no longer are viewed as infrastructure and are given 'personhood' by the mainstream. For example, the system of coverture is defined on Wikipedia as "a legal doctrine whereby, upon marriage, a woman's legal rights and obligations were subsumed by those of her husband" , and was in practice till the late 19th century across England and places like North America which were based on English law. Married women as well as slaves could only take legal action (like filing lawsuits) via the man they 'belonged' to [5].

Only after the definition of a legal 'person' with fundamental rights was expanded to include slaves and women, were they legally liberated. Recently, Lake Erie in Ohio, USA was given the same rights as that of a person, which shifted its position from infra to supra. The citizens can now sue against agricultural malpractices on behalf of the lake, that legally has the right to be healthy [6]. The Ganges and Yamuna rivers in India, which are sacred for Hindus, were also granted legal rights but perhaps for different reasons [7]. There has been considerable criticism of this move as pandering to Hindu nationalism which has seen a major rise in India recently [8]. Nationalistic or not, the rivers continue to be two of the most polluted in the world.

Social structures are soft infrastructures. They enable cooperation and hierarchies that come with cooperation. Writing in Critical Infrastructure, Jamie Allen says "...infrastructures are at once easily detected and indiscernible – they are everywhere and nowhere, at once. These dynamics of appearance and disappearance, of visibility and invisibility are perhaps somewhat fundamental to what is to be technological." [9] Perhaps we should look into the question "who is infrastructure" instead of "what is infrastructure". As inequalities between the 'western world' and the 'global south' are revealed, a critical approach would be to study the relationship between the powerful and the powerless within the global south as a effective way of understanding what is infra and what is supra.

Notes

[1] Shannon Mattern, "Deep Time of Media Infrastructures," in Lisa Parks and Nicole Starosielski, eds., Signal Traffic: Critical Studies of Media Infrastructures (Urbana, Chicago And Springfield: University of Illinois Press, 2015): 106.

[2] Anjali Lukose, "...women say 'not baby-making machines'" The Indian Express, November 13 2014 https://indianexpress.com/article/cities/mumbai/posters-fail-to-amuse-all-fuming-women-say-not-baby-making-machines/

[3] Diane Coffey, Excerpts from the paper "Where Bharat Goes", "Manual scavenging, social exclusion of past even today play crucial role India's sanitation outcome", Counterview.org, February 21 2019 https://counterview.org/2019/02/21/manual-scavenging-social-exclusion-of-past-even-today-play-crucial-role-indias-sanitation-outcome/

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[8] Erin L O'Donnell, "At the Intersection of the Sacred and the Legal: Rights for Nature in Uttarakhand, India" Journal of Environmental Law, Volume 30, Issue 1, p.135–144, March 2018, https://doi.org/10.1093/jel/eqx026, 06 October 2017

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Emil Lytikkä

the City as Facilitator

In 'Maintenance and Care', media theorist Shannon Mattern mentions when a specific infrastructure doesn't work properly, the gaps are filled with local creative solutions [1]. I'm fascinated by the idea of having the city supporting the infrastructure at the most critical points, but other than that, involving the citizens in it. Commons-based peer production frames quite well how it would work. The city would encourage and supply communities with the right tools to maintain the infrastructure.

Could infrastructure be designed so that it involves communities in its maintenance model? Especially if it's already known that it will be problematic or even impossible to maintain an infrastructure in remote areas. There is much to gain from involving local residents in something like this. The city can maintain the infrastructure and the community is empowered and brought together by the task. There are some limits to a model like this though. It won't be able to assign specialist jobs to citizens, because of the difficulty or the danger involved.

Would it be possible that a well-working infrastructure is something that could be a replacement for the pride and joy a region once had in its local industries? This could possibly be done by making the infrastructures more visible and easily approachable for the local residents. I wonder if this could create a sense of community in a city, by making the inhabitants more aware of how it works and that they're a part of it?

Is a more intertwined relationship between communities and the public sector an option when the current infrastructure crumbles?

Sources:

[1] Shannon Mattern, "Maintenance and Care," Places Journal , November 2018, https://placesjournal.org/article/maintenance-and-care/

Eerika Jalasaho

Encounters of Animals and Media Infrastructure

> ***We cannot separate media from bio-physicality.***
>
> *- Lisa Parks and Nicole Starosielski [1]*

Can an animal be part of media infrastructure? What are the relations?

In an article called Mediating Animal-Infrastructure Relations Lisa Parks writes about ospreys on cell towers and a case where a zoo chimpanzee escapes, ends up on the power lines and wildlife-crossing at highways. She wants to reinforce the ontological inseparability of animals and infrastructures by exploring their intra-actions [2].

If you think of birds, they naturally locate themselves using the Earths' magnetic field when migrating during winter. There has been a debate on whether electric and magnetic fields affect biological processes and human health. Controlled experiments in the University of Oldenburg demonstrated that European robins lose their ability to use the Earths' magnetic field when exposed to a low-level AM electromagnetic noise between around 20 kHz and 20 MHz, the kind of noise routinely generated by consumer electrical and electronic equipment. The birds gained the ability back to orient to the Earths' magnetic field when they were shielded from electromagnetic noise in the frequency range from 2kHz to 5 MHz or tested in a rural setting [3].

Figure 1.
Image Credits: Adobe Stock

In a European Commissions' Guidance for Energy Transmission Infrastructure from 2018 the listed impacts to birds are through clearance of land and the removal of surface vegetation: the existing habitats may be altered, damaged, fragmented or destroyed and the indirect effects could be much more widespread especially when projects interfere with water and soil quality. Also, when building the site there will be increased traffic, presence of people, noise, dust, pollution, artificial lighting and vibration and the risks of collision with power cables [4].

Electrocution can have a major impact on several bird species, and causing the death of thousands of birds annually [5].

There is a strong consensus that the risk posed to birds depends on the technical construction and detailed design of power facilities. In particular, electrocution risk is high with "badly engineered" medium voltage power poles ("killer poles") [6].

By acknowledging the loss of thousands of birds annually because of the energy infrastructure can we say that they are part of energy infrastructure? Lisa Parks claims that all infrastructures are media infrastructures. If we think of anthropocentric agriculture, where cattle, sheep, horses, hens and all the other species are involved, it makes it obvious to think that they are undoubtedly part of infrastructure.

All this makes me wonder the affect on other species when used as a part of infrastructure, manipulated and how it affects them genetically? What is then the relation of infrastructure to bio- diversity?

Figure 2.
Image Credits: BirdLife International

Sources:

[1] Lisa Parks and Nicole Starosielski, eds., Signal Traffic: Critical Studies of Media Infrastructures (Urbana, Chicago And Springfield: University of Illinois Press, 2015).

[2] Lisa Parks, "Mediating Animal-Infrastructure Relations", Forthcoming in Being Material, Stefan Helmreich, Marie-Pier Boucher, Rebecca Uchill, eds. Cambridge, MIT Press, 2019.

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Hanna Thenor Årström

Dirty Mining and Clean Data in the Swedish Industry

As a Swede, I remember well when in 2013 Facebook opened its first data center outside of the US in Luleå, a northern city in Sweden [1]. It was reported in all the major news channels. One of the largest and most impactful social media corporations chose Sweden?!

For Luleå, the deal with Facebook was great advertisement for the city. Data as a product has the appearance of modernity, innovation, high-technology, creativity and in this case green energy, which goes in line with how Sweden as a nation wants to market itself. Most news articles were written in a weirdly proud manner. The primary reason to put the data center in Luleå, according to Facebook, was the natural cooling of the servers provided by the cold climate [2]. The science magazine *Forskning & Framsteg* wrote an article jokingly named *"This is where your likes are cooling down"* (author's translation) [3]. I remember spontaneously feeling proud as well. We Swedes are raised with a love/hate relationship with the US. We love to feel better than the Americans, to look down upon them for their capitalist, openly class-dividing society structure. But we also watch an overwhelming amount of entertainment from Hollywood and think that the English language is much cooler than Swedish. Secretly, we all want to move to New York, LA or San Francisco and pursue the American dream. We are sold the idea of a service society, where machines do the dirty work, and we can sit back and enjoy our touch screens and fancy, minimalist clothes. That dream, however, soon fades if one leaves the big cities. Up until a few decades ago Sweden was an industrial country, with people working in factories, farms, forests and mines. And even though we are taught to believe that the industrial society died to give birth to a service-based one, Sweden's economy still gets its stability from those old industries.

Facebook and other IT companies make a good front page, but the dirtier industries supplying them with material and energy still exist. And this is where Luleå's history as an industry city becomes interesting.

Luleå has largely flourished because of the iron mines in Malmberget close by, where Luleå has served as the harbour for exportation of iron goods since late 1800s. The municipality now consists of 77 000 people and hosts one of Sweden's leading technical universities. In the meantime, the mining town Malmberget is literally collapsing. Since the 1950s, the mine has created a 200-meter hole in the ground, that is constantly growing and swallowing buildings and roads. This has caused the city to expand in new directions and buildings are being moved away from the hole's edges. Ironically, the industry that brought the town into life, is also the reason that in the near future Malmberget will not exist in the place where it is today [4].

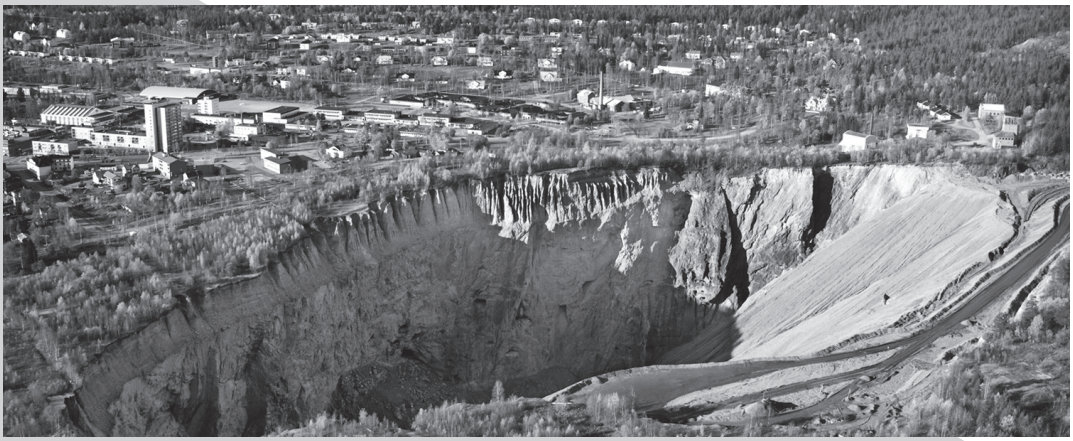

Figure 1. *The hole in Malmberget.*
Image Credits: LKAB.

The mine is utilised by state owned corporation LKAB (Luossavaara-Kiirunavaara AB), which also runs the world's largest underground mine in the inland city Kiruna (see Figure 3.). There, the effects of the mining are even bigger. The whole city of Kiruna is now being moved to a new location since the current one is collapsing due to underground mines. Some buildings have been moved, but most of the city will be built completely from scratch to house all the mine workers and other citizens. The new city is said to be financially, socially and environmentally sustainable [5].

Figure 2. *Kiruna's new city center in the front, with the mine visible in the far right.*
Image Credits: Peter Rosén

Meanwhile, the ecological impact of the mining industry next door is non-reparable. Mining disrupts the landscape and leaves open wounds in the ground. There is always a risk of toxic contamination of fresh water and lakes. According to environmental organization Naturskyddsföreningen, the mining industry together with the steel and iron plants stand for over 11% of Sweden's CO2 emissions [6]. While the emissions from Swedish industry overall is decreasing, those from the mining industry has increased by 25 percent between 2015-2017 [7]. The indigenous people of the Nordics, the Sami people, have historically and as well in the present fought against the mining industries since this entails the loss of land, contamination of fresh water and the disruption of reindeer routes. The United Nations has critiqued the Swedish government for not doing enough to protect the indigenous people and their rights to their land and Sweden has yet to ratify the ILO (Indigenous and Tribal Peoples Convention) [8].

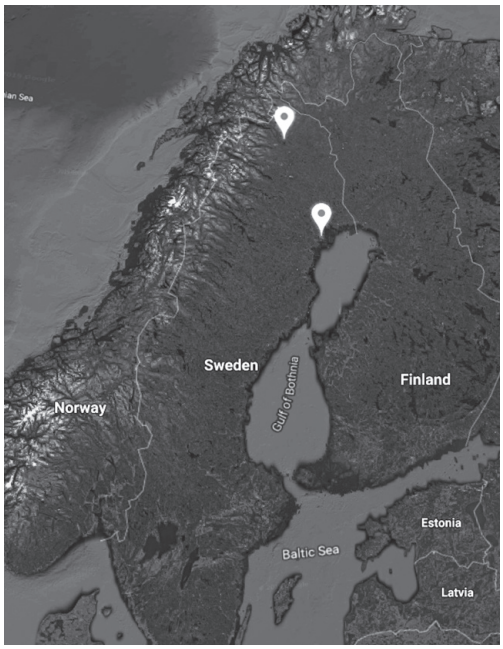

Figure 3. *Kiruna at the top and Luleå at the lower right on Google Maps.*

Facebook is now planning to double the size of their data center in Luleå, making it 100,000 sqm. The center is purely driven on hydro energy, according to Facebook. It directly or indirectly gives full time work for 400 people per year, compared to LKAB who employs around 4000 people in Sweden, with a majority working in the northernmost regions, and indirectly provides work for thousands more through related industries. Sweden's iron mines jointly produce 90% of the iron in Europe [9].

Critical voices raised the concern that data centers are not able to replace the traditional industries, such as mining and forestry when it comes to employing large numbers of people. Others have claimed that Facebook is merely the first of many data companies that will open centers in northern Sweden, thus leading the way for more work opportunities in the future. But how many jobs can this sector actually produce, and especially in relation to its high energy consumption? Will it be possible for all those data centers to run on hydro energy? Probably not.

As it is generally known, new media infrastructures are often built on top of existing ones. The data center is no exception. In 1910-1915, a large power plant was built in Lule älv, a river ending in Luleå, to be able to replace some of the coal imported from Europe. But the water flow was too high during Spring. Eyes fell on the newly inaugurated national park surrounding Stora sjöfallen, at the time one of Europe's biggest water falls. The government made the decision to exclude the water fall from the national park so that it could be dammed, with the consequence that the water flow in the river could be controlled like a tap. The Sami people who fished in the area, and whose reindeer lands would be put under water, were not asked for permission. If the same decision was taken today, it would most likely lead to massive demonstrations from the public. I have been at Stora sjöfallet myself. It is a large silent lake with a small flow of water coming down the water fall [10].

Surely, it isn't Facebook's fault that those precious natural resources were destroyed a hundred years ago, and one can argue that the mining industry is necessary for providing the world with minerals. But the societal structure that killed the magnificent water fall Stora Sjöfallet at the beginning of the century is still working its magic, but now on a global scale. With a promise of work opportunities, multinational corporations are allowed to exploit land and energy resources not just in developing countries, but also in Sweden, whether they are producing minerals or data. Only a tiny portion of the capital produced goes back to the local inhabitants, and even less to the indigenous people. The mines provide material that is necessary for computers, phones, cables, etc to exist in the first place. Facebook's "clean energy footprint" is not so clean after all. But perhaps, if we continue down this path of environmental destruction, the world will look much like the inside of a data center in the end. Lots of blinking machines, but no life.

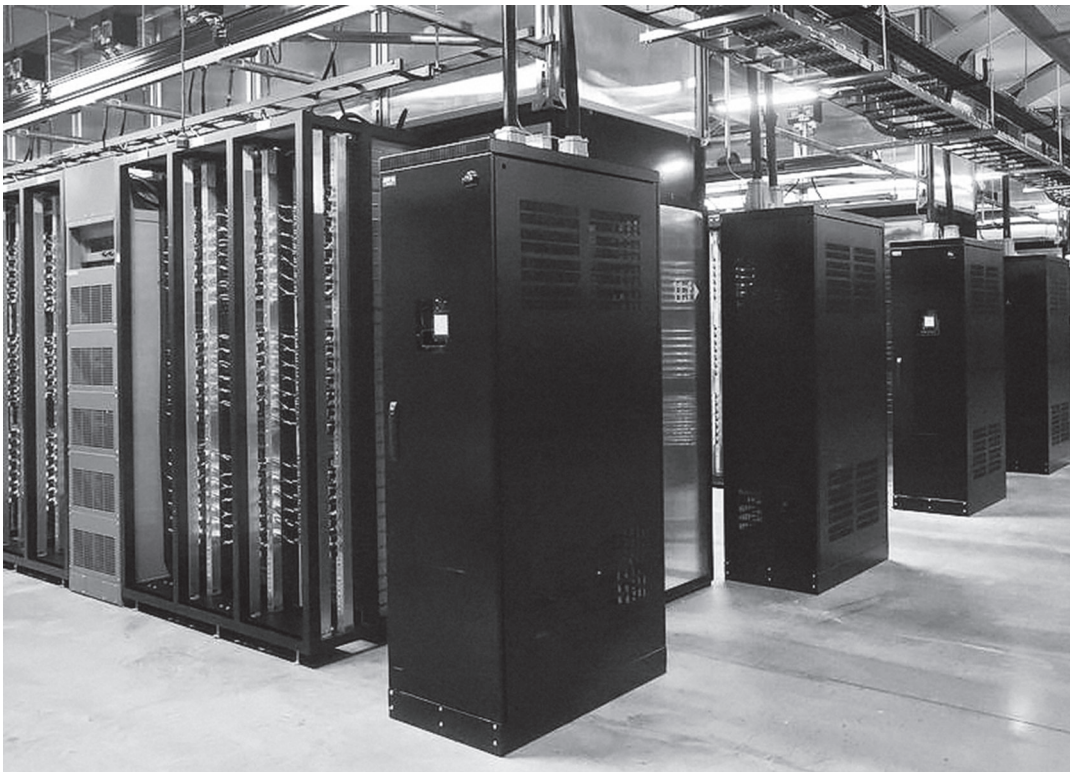

Figure 4. *Facebook's data center in Luleå, Sweden.*
Image Credits: TT

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Lorenzo Marchesi

the many shapes of olivetti company

Talking about the ways in which old media infrastructures meet new technologies, and how they begin to shape each other, an example comes to mind. In the past years, Italy is not often mentioned in the environment of digital and technological innovation, on the contrary, the U.S. and the Asian powers (China, Japan, South Korea, etc..) dominates the field of technology.

However, If we go back a few years, there was a time, between the 30s and the 60s, when a small company in the north of Italy was leading the progress of media technologies and communication: Olivetti.

When the company was founded, in 1908, it was identified as "The first national typewriter manufacturer[1]" and the production of typewriters remained the "core business" of the company for many years, up until the 60s. Besides the production of the "traditional" typewriters, the company had several "top-selling" products such as calculators and accountant machines, sold both in the internal and on the international market. During the years, and thanks to the innovations in the electronic field, the Olivetti products became less mechanical and more electronic to keep up with the speed of booming progress. Only then problems arose.

Figure 1. *The "Red brick factory" the first Olivetti headquarter, designed by Camillo Olivetti.*
Image Credits: Fondazione Adriano Olivetti.

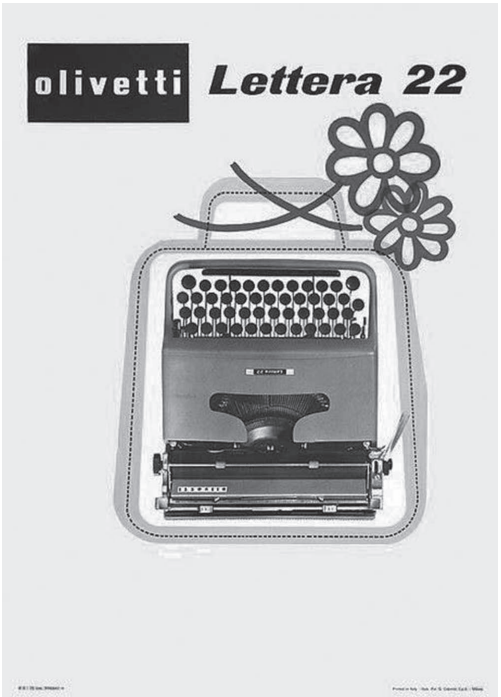

Figure 2. *Olivetti Lettera 22 Poster designed by Giovanni Pintori for the Olivetti Lettera 22 - 1950.*
Image Credits: ninonbooks - flickr.

Figure 3. *Electronic calculator 50/60.*
Image Credits: Archivio storico Olivetti.

During the second half of the sixties, the company tried to compete without success, with the Japanese production of electronic calculators. As an attempt to survive the fierce competition, Olivetti attempted to release a new innovative product: the first personal computer.

The "Programma 101" was presented at the New York's BEMA exhibition in 1965 and was a huge success, the machine was a desktop automatic calculator, not nearly similar to modern computers but still a big leap forward both for the technological innovation and the unstable revenues of the company.

Despite the success of Programma 101, in the following years, the company struggled to compete with the U.S. and Japanese companies but was still able to design "top-selling" products such as the "Olivetti ET101" the world's first electronic typewriter in 1978. During the following year, the "Olivetti Advanced Technology Center" was opened in Cupertino, CA, just two blocks away from the Apple headquarters. After the big move, during the 80s the company went through a new era of success thanks to the collaboration with the American company AT&T, becoming one of the most important European manufacturers of personal computers.

Figure 4. *The Olivetti advanced technologies R&D center in Cupertino, California, ca. 1982.*
Image Credits: Archivio storico Olivetti.

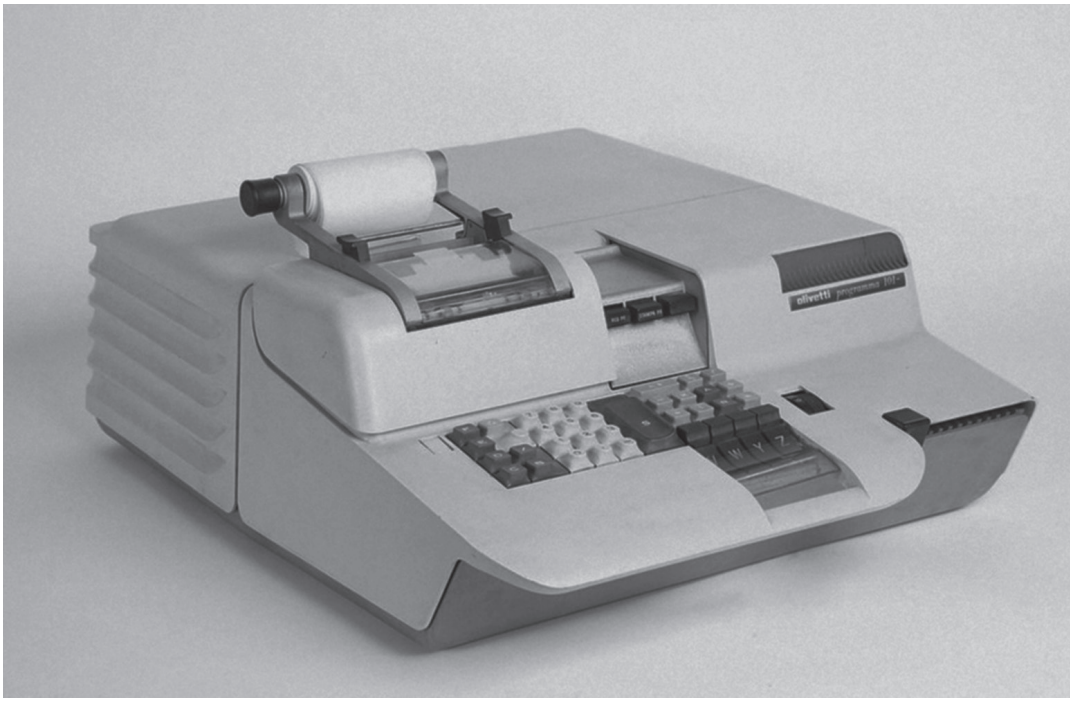

Figure 5. *The Olivetti Programma 101, designed by Pier Giorgio Perotto.*
Image Credits: Wikimedia Commons.

During the 90s and with the slow rise of mobile communications, the lack of funding and the crisis of European and Italian markets prevented the company to keep pace with the spread of these new technologies. However, Olivetti's contribution to the world of technology development was not yet at his end.

At the beginning of the new century, Olivetti and the telecommunication company "Telecom Italia" founded the "Interaction Design Institute Ivrea", a graduate design program in the field of Interaction Design. The school operated from 2001 to 2005 and was involved in relevant projects in the design world: among them: the prototyping boards "Wiring" and "Arduino", and the graphics software prototyping environment "Processing".

Figure 6. *Interaction Design Institute Ivrea.*
Image Credits: Scoobyfoo - flickr.

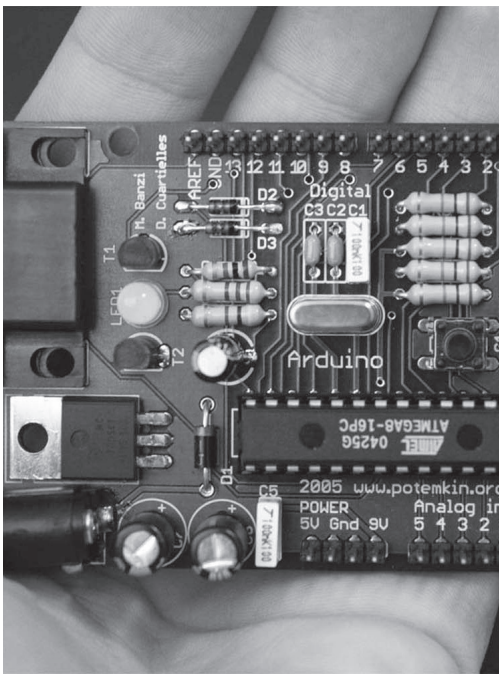

Figure 7. *An early Arduino board.*
Image Credits: Wikimedia Commons.

Besides the iconic design of their products, Olivetti always maintained a clear and recognizable "corporate image" both in their products as well as in their infrastructures. Olivetti's image was reflected in every detail: from the first iconic "red brick factory" to the realization of their retail stores, from their production plants all over the world to the "Blue House", home of the Interaction Design Institute. In addition, Olivetti's corporate image was also used by Apple as a base to build their first "Apple Stores".

The Olivetti story is one, amongst many other, "forgotten" stories in the world of media, a small player in a world of gigantic companies that has managed, here and here, to influence forever the world of technology, design and media communication.

Figure 8. *Olivetti store in Turin designed by Hans von Klier in 1977.*
Image Credits: Fondazione Adriano Olivetti

Figure 9. *The Olivetti Shop in Venice located in Piazza San Marco, designed by the architect Carlo Scarpa.*
Image Credits: Wikimedia Commons.

Figure 9. *Olivetti showroom in Switzerland, 1957*
Image Credits: justrealcasual.blogspot.com

Notes:

[1] As stated on a billboard placed on the first factory opened by the company

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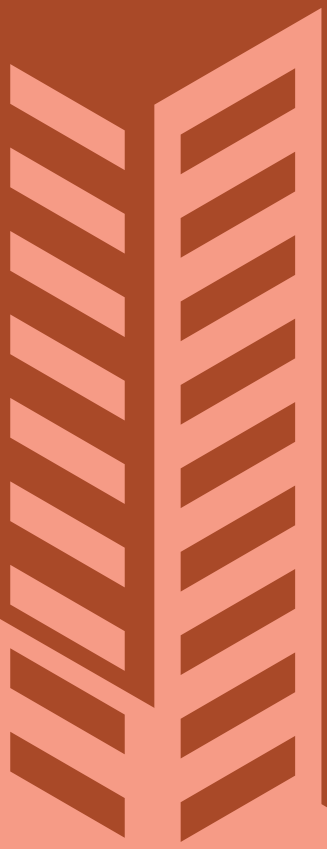
Aalto University
School of Arts, Design
and Architecture



This first volume of *Infragraphy* is a compilation of critical student writings and photo essays about media, infrastructure and the environment. These texts are outcomes from the "Archaeology of Media Infrastructures" Master of Arts course in the Spring of 2019 at the Department of Media, Aalto University Finland. The course examined media infrastructures including the concept of deep time, the materialities of the Internet, Artificial Intelligence, digital labor, water, energy, and critical infrastructure.

Authors:

Eerika Jalasaho

Reishabh Kailey

Leo Kosola

Emil Lyytikkä

Auri Mäkelä

Lorenzo Marchesi

Hanna Thenor Årström

Editor:

Samir Bhowmik

A! Aalto University
School of Arts, Design
and Architecture