SEEING STONES AND
SPACES BEYOND THE
VALLEY

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Digital Ecology

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Innovation Born out of Chaos

"A time will come when you have to choose between what's right and what's easy and pleasurable."

A.D.

1.
Easy

Come to a halt, take a deep breath, and consider the moment we are beginning to experience together. At this very moment, for your sake, I have articulated my ruminations in words; I have tapped them on plastic keys to examine their visual representations on a computer screen, which enabled me to send the finished file to the editorial board, where the work to give it a print-adequate form has commenced. For most of us, this set of default activities comprises an intrinsic element of our daily routine of interacting with machines: we enter input data that is subsequently saved in memory, processed, and generated as output data. In the early 90s, this process seemed a futuristic notion whose consequences and potential implications could be comprehended only by hermetic collectives of informaticians and scientists. I still remember emotions shaking me while sending my first email with a graphic design attached. My mailbox was handled by the owner of a neighbourhood internet café to whom I passed a small artwork created in the Paint program saved on a floppy disc and asked frightfully if he could send it as a priority as it needed to be delivered by the next day.

Today, no one is shocked by petabytes of data sliding through our electronic mailboxes that successfully replaced time-consuming visits to the post office and saliva-glued shreds of paper providing the shared content with means of travel. It is only natural that, as human beings, we ceaselessly seek space for transforming and optimising the energy we devote to exercising our daily routine. For some, it may sound like a definition of laziness; others would call this process a habitual execution because of the human brain's purposeful avoidance of any activity requiring effort in order to save valuable power resources. The convenience ensured

by powerful computers – automating processes and processing data by a pre-coded algorithm – perfectly fits this assumption.

The typical usage of devices subjecting us to a set of complicated calculations has been changing and began to advance with the development of computer technologies. The army applied the first models, occupying large spaces and requiring entire teams to operate them, for military purposes like codebreaking or ballistics. It took merely fifteen years to miniaturise, commercialise, and disseminate access to such devices. Consequently, we may stream the entire seasons of the series, work remotely, scroll through TikToks, or earn digital currency by sharing computational power to verify transactions in distributed databases.

It is the year 2022, and twenty-two billion devices are connected to the Web. As a consequence, it facilitated a quick emergence of a new environment: a technical one, which, in turn, is becoming an inherent element of natural and social spheres. The antennas of mobile systems, tightly affixed to chimneys and stories of our residential buildings, have become an inseparable element of the reality we are surrounded with. Our vigilance has been lulled, creating a situation in which we do not consider potential consequences connected to the future development of, among others, 5G technology, which may lead to even more aggressive seizure of public space by the infrastructure needed for its support.

Marketing communication one-sidedly informs us only about benefits while omitting technological aspects like the fact that the fifth generation of wireless communication uses a technology known as millimetre waves (EHF) as its driving force. Just like with any innovation, problems and obstacles to be overcome before it is widely implemented arise unavoidably. One of them is the network's range and the vicinity of base stations offering stable connection only when positioned maximally five hundred metres from each other. Many new receivers would have to be placed to cover the areas currently covered by the 4G network. Therefore, the 5G network's implementation in rural areas and small towns seems highly unlikely. The solution will be rather used in the centres of great metropolises, wherein potentially most users can access it in a small area. The calculations devised while simulating New York indicate that ensuring connection would require allotting plenty of space for ca. two million stations. A real invasion!

Gordon Moore predicted the pace of mass digitalisation's development in 1965: hence, the law named after him predicts that the computational power doubles each year whilst the cost of its acquisition decreases. These are two main factors accelerating the pace at which the communication and information technologies market develops. The increase of the transistors' quantity and miniaturisation of electric circuits' size has ignited a global revolution and changed how most spheres in our lives function. However, such a wide-scale activity involves various perils – the most disturbing being ecological instability and shortage of natural resources essential for sustaining the current level of economic growth.

It is easy to lose sight of its actual image when we witness the world through glass screens displaying merely selected fragments of reality. When we scroll ceaselessly, we forget that our activity in the digital space comprises an element of a particularly complex jigsaw. Let us survey, for instance, the issues connected to streaming data transfer. Netflix provides access to thousands of titles that soothe, amuse, sadden, distract from reality, and lull our vigilance. Increased volume of video content connects directly to the spread of infrastructure necessary for its support;

its emergence, consequently, serves as a foundation for the build-up of increasingly more services using data. A technological domino effect occurs, eventually exerting direct influence on the increased emission levels.

The first months of COVID-19 pandemics necessitated that the European Union impose limits on Netflix and YouTube platforms, thus regulating the traffic they generate and how they strain the network. Without top-down action, certain geographical areas would be deprived of the possibility to work remotely due to overloaded bandwidth. In quite a brutal fashion, we witnessed the limitations of digital space; we realised that even though we take gigabytes of content from an enigmatic cloud, we still managed to reach its limits.

For years, corporations ensuring connection and hosting accustomed us to limitless functionalities. It suffices to buy a SIM card available in every store at the corner, and, without any problems, we gain access to the unbounded expanse, the world with no constitution but responsible for more CO_2 emissions than two hundred and eight states on the Earth.

As counted by the International Telecommunication Union (ITU), information and communication technologies (ICT), including all products that store, download, process, convey, or receive digital information through devices like PCs, smartphones, mobile apps, emails, or streaming, were responsible for the CO_2 emissions at the level of 620 megatons (Mt). Only eight countries emit more than this value: China (10 668 Mt), USA (4 713 Mt), India (2 442 Mt), Russian Federation (1 577 Mt), Japan (1 031 Mt), Iran (745 Mt), Germany (644 Mt), and Saudi Arabia (626 Mt).

Painstakingly fabricated culture of being “always connected,” imposed on us without questions and prior consultations, lead us to global overstimulation. Omnipresent notifications, hooks, and incentives disorient and leave no room for reflection. In the world we inhabit, it is difficult to find a moment to consider whether the current state of affairs is concomitant with the one we wish to partake in, whilst global systems proliferate and prey upon the energy of our confusion.

2.
Sources of ignorance and Manipulation

Agnotology is a branch of science devoted to culturally mandated ignorance distributed nowadays on a mass scale. Noam Chomsky repeatedly pinpointed the maintenance of societal ignorance as a planned strategy of mass manipulation. He claims that the lack of access to the tools for deepened analysis of reality, the transmission of anecdotal data often removed from the context, and the lack of the push for education, lulls our vigilance and sustains the current order of the world, where freedom of an individual is gradually limited in favour of systems.

Education is the most effective remedy for ignorance. During Enlightenment, when education was defined as inquiry and creation, it comprised the highest goal of a human. In the 21st century, when skewed communication floods us from every conceivable direction, science, as never before, is threatened with degeneration that leads humanity towards intellectual stagnation.

These threats are particularly distinct when it comes to noticing and understanding our relation and co-dependency with global computer networks – the most significant project created in the history of humanity. Even if the Internet plays a crucial role in our lives, hardly anyone knows where it comes from and what functions it fulfils.

3.
Technological dyslexia

Statista, a German organisation specialising in market analyses, estimates that the global code-writing community will have reached 28.7 million by 2024, which equals a growth of 3.2 million in comparison to 2020. The majority of this volume comes from China, which strives to maintain its position as a global technological leader at any cost.

Thus, assuming that currently there are 24.5 million people who write code and understand it, they comprise 0.003% of the global populace. Such a minuscule fraction of people develop and take responsibility for digital products that create our means of communication and reality perception. The remainder – 99.997 per cent – are unconscious individuals following their projects' visions.

Now, imagine that those who design interactions – the moments of your contact with a machine – revere Steve Krug, the author of the book *Don't Make Me Think*, as their guru. In his theses, Krug proclaims that programmed tasks, like making a purchase, submerging in the stream of content, commenting, and automated uploading of photos to the cloud, should be possibly easy to handle. Technologies, served on a silver platter in the form of most pleasurable experiences, seasoned with a sprinkle of endearing procedures and colourful buttons, wean us from thinking, questioning, and critical approach, whilst the lack of market regulations places applications and entire systems flaunting ethical standards within a thumb's reach. Our habituation to function with precisely designed forms fabricates a delusive sense of stability. The immense process complexity and breakthrough events of previous years emphatically convinced us that nothing is truly predictable, and chaos is the natural tendency governing the world. Each of us adapts to it on our own terms, thus causing the emergence of social trends celebrating this chaos that started to denote a sense of comfort in the face of digital perfection.

Labelling the recipients of designed solutions as 'users' – and thus stripping us from the sense of our humanity – is quite upsetting as well. Digital solutions are designed with users in mind – their only task is to use and abuse, leading to a swift purchase of a new model. Yet again, our emotions, hopes, and desires are omitted. What is worse, the privileged social groups design the digital space, which underlines the importance of challenges connected to exclusion. According to the World Bank statistics, one billion people, ca. fifteen per cent of the populace, have some form of physical or mental indispositions. An analysis conducted in 2020 showcased that about ninety-eight per cent of web pages do not meet the availability standards known as WCAG standards. This means that people with disabilities can freely use only about two per cent of online resources.

Ethically dubious form and a staggering pace of computer networks' development have been dominated by the narratives imposed by microelectronics and software research centres in Silicon Valley. Wherefrom the mineral in its name? It stems from the roots of the microchip revolution and connects to the silicon-based semiconductor technologies developed there, with silicon being a fundamental component in the process of electronic equipment production.

A culture created by the group of prominent technological players fabricated a prism through which we have begun conceptualising what the Internet is and what possibilities it brings. The lack of functional restrictions prohibiting monopolisation of this market area has eventuated the dominant role in shaping the direction of the Internet's development of the MAMAA group.

During the first nine months of 2021, they managed to cumulate the capital of:

M (Microsoft): 529.5 billion PLN
A (Alphabet – Google): 724 billion PLN
M (Meta): 334.72 billion PLN
A (Amazon): 1321.37 billion PLN
A (Apple): 1011.30 billion PLN
For comparison, the annual budget of Poland for 2021 amounted to 482 billion PLN.

It is not a mystery that such wealth has arisen through labour exploitation and environmental devastation. The first abuses on the part of Amazon occurred already in 2008 when ultimata breaking the anti-monopolistic laws were put forth to on-demand titles publishers, while in 2018, we learned of antiunion practices aimed at combating organised labour force deemed to threaten the company. Meanwhile, in 2012, in response to the CBS investigation unveiling the involvement of children, illiterate persons, and desperately poor – and thus vulnerable – ones in the process of cobalt extraction, a lawsuit against Apple, Google, Microsoft, Tesla, and Dell was filed, meant to coerce them to cease benefitting from exploiting underage people for extracting the mineral essential for producing the energy-storing component of their devices: the lithium-ion battery.

Actual latent costs of production and its untransparent processes directly contributed to strengthening economic inequality and lowering markers of social wealth. Gathering riches by a narrow group of influence deprived smaller enterprises of competitional space, which is the fundamental condition for the existence and development of a healthy market. The symmetry of the digital environment's growth has been permanently disturbed, and with each day, it is increasingly difficult to restore the level of healthy balance.

It has become only natural to establish contacts and seek information in the applications of the Meta group (formerly Facebook), we complete office work on the Microsoft tools, and send mail – constantly scanned for keywords – from Google mailboxes (the Alphabet group). The aforementioned products are either the imposed systems in which we function – when you purchase a new computer, you do not make an independent decision regarding the preinstalled system – or digital services – theoretically free to use but actually requiring us to perform hidden work.

In Poland, we spend, on average, about two hours a day on social media. During this time, we scroll through information, upload photos, comment, and give opinions: we feed and teach algorithms. It seems irrelevant in a daily frame. However, in a year, it surmounts to an entire month – a working month. Thirty days we more or less consciously decided to devote ourselves to habitual swiping of a thumb on a piece of glass.

5.
State investments in data centre development

Twenty-two billion connected devices, including smartwatches, pulse-measuring bands, the Internet sensors, all the things enabling a plethora of objects to constantly gather data, monitoring cameras, face recognition technologies, 5G, scattered data registers, remote learning platforms, video chats, social media, navigation apps, mail messages. All these solutions ceaselessly gather and analyse data, and each byte sent and stored requires large-scale and energy-costly terminals and infrastructure.

In response to the growing demand for infallible access to computational power, increasingly more data centres are relocating to urban centres. Large server rooms exist practically in every country of the world, thus increasingly integrating with the urban tissue. A choice of localisation is never accidental as it depends on such factors as low costs of energy intake and equally low risk of natural disasters.

The research group Cushman & Wakefield analysed 1189 global markets and, accordingly, prepared a chart of the most attractive localisations for investing in data centres. At the top places are Montreal, Reykjavik, and Warsaw. Are cities ready to face the rapid increase of surplus infrastructure? After all, new types of large-scale centres significantly impact local energy circuits by using hundreds of electrical energy units per day. In smaller countries, like Denmark, the question is already being raised. According to the Danish Energy Agency, data centres' energy usage may amount to even fifteen per cent of the total energy demand in 2030.

The leading companies are fully conscious of these trends and threats; they strive to protect themselves from volatile energy prices and build an environmentally conscious brand by investing in renewable energy sources. According to the International Energy Agency (IEA), the six biggest corporate recipients of renewable energy sources in 2021 are companies from the ICT sector, with Google at the top, which, in 2019, announced an investment of 2 billion dollars in opening a new cloud region in Poland in order to improve its service in East and Central Europe and signed a deal with the Polish cloud operator regarding sale mediations to accelerate adopting American technological thought on Polish soil.

Unfortunately, in spite of ambitious plans, the reality brutally verified the Google Cloud Region Europe Central in Warsaw. According to the markers for 2022, the city's emission intensity equals 622 grams of carbon dioxide for every kWh of produced energy. Only six cities all over the world are ahead with their economies being similarly carbon-based – these are Sydney (727), Bombay (721), Melbourne (691), Delhi (657), and Jakarta (647). Among twenty-seven Google regions, only seven qualify as "low-emission." That means that the generated carbon dioxide intensity

does not exceed 200 grams per kWh. As for the rest, the emission is compensated by purchasing reduction units. Thus, Google buys the possibility of calling itself an environmentally neutral company. After all, it's peanuts for them.

The Google investment entailed their main competition, Microsoft, to announce an expenditure of one billion dollars on a new data centre in Poland. Its strategy differs slightly and focuses on educating natives on how to take full advantage of the cloud resources – in hopes it will assist start-ups, entrepreneurs, and other persons using the services. It seems that there is no turning back; the future is bound with complete transfer to the cloud; what we overlook is a greater risk of increased exploitation of local networks and natural resources inflicted by local data centres.

Let us consider this situation from a different perspective. Infrastructure development may play a vital role as a driving force of transformation towards renewable sources – particularly in Poland, where over seventy-four per cent of energy comes from coal. There exists a scenario according to which Google and Microsoft, along with Web operators, can influence the production and distribution of green energy towards a more balanced lane, including infrastructure, effective network integration, and elasticity. With significant probability, such development would benefit the entire system and facilitate reaching climate goals. But to reach these challenges, we would have to take a step back to better comprehend the characteristics of the whole system of information and communication technologies, especially how their functioning influences energy usage. Educating the authorities should be the first step so that they may support and limit data centre operators through preparing adequate guidelines, standards, and regulations protecting our interests and environment.

The European Union is beginning to dynamically act on this topic; in 2020, it instituted the "European Green Energy Coalition," calling, among others, for investments in the development and implementation of ecological digital solutions of high energy efficiency. As of 2022, the coalition comprises twenty-eight countries (including Poland) and twenty companies from the IT sector. The future will verify what benefits their project will bring and how instrumental such cooperation can be.

6.
The global crisis of semiconductors

Silicon semiconductors called chips comprise the heart of each electronic device – without them, neither your laptop nor your phone would exist, and the development of supercomputers used in science would also come to a halt. Each time you boot your device and open the installed operating system, consider that it is only due to the work of a small component fulfilling a selective role of conductor or isolator of the electric impulse.

The American pioneer in this regard, IBM, perfected semiconductor production. On a two-nanometre sized plate, it can put 50 billion transistors. Innovations in the sphere of electronic circuit minimalisation enable the progress of advanced nano-medicine or 'intelligent dust,' meaning sensors in sub-millimetre scale within wireless networks of autonomous computational platforms. Imagine this cloud of sensors, each as small as a grain of sand. They may float in the air and collect

data on its quality, monitor urban traffic, or check for fire threats in the forests. Microsoft Research speculates that around the year 2025, the miniaturisation of transistors would shrink them to the size of one atom. Thus, we would exhaust the limit determined by Moore's law and achieve the final frontier of maximal computational power.

Only in 2021, in spite of the rampant "shortage economy" and impeded supply chains, so many chips have been produced that for each person on the Earth, there fell one hundred and twenty-eight. As the leading producer, the Chinese government endues this area with similar strategic importance as the nuclear weapons development programme. It is guided by the goal of self-sustainability with regard to technology to be used in all future endeavours in the sphere of science. During the annual UN session in 2021, President Xi Jinping pledged to devote 1.4 billion dollars to research in this area.

Despite the US and Chinese strenuous efforts, one company far outperforms the competition in producing advanced logical systems necessary for computer systems. The Taiwan Semiconductor Manufacturing Company (TSMC) is responsible for producing chips ordered by the majority of global technology companies like Apple, Nvidia, and Media Tek. Thus, when TSMC records shortages, companies scattered all over the world hold their breath.

On a global scale, the dependence of the Western states on Taiwan is worrisome, primarily due to China and its territorial claims to Taiwan – China often announced that if necessary, it may take control of Taiwan. However, the situation is more complex, as China is economically dependent on Taiwan while the latter is tightly connected politically and economically to the United States. As a result, multi-billion plans emerge, engaging many countries – each of them strives for the dethroning of the current king and wishes to bear a palm in the race for dominance in the new technologies market. However, it is still unlikely to create a complex semiconductor ecosystem on a whim and dethrone TSMC, which has been building its position for the last thirty years.

The zest of this situation lies in the fact that producing chips has become in the last years exceptionally complex and costly. It is hard to keep up with it. Hence, the number of leading producers fell in 2020 from twenty-five to merely three. Increasingly fewer companies specialise in production because significant capital is needed for opening the production line, and the applied technologies become outdated after ca. five years.Such a short lifespan necessitates maximal exploitation and working 24/7. The plant must release hundreds of millions of devices to be sold at exorbitant prices to remain profitable. The economics of the business is ruthless.

For the last years, the situation has been propelled by the emergence of so-called "foundries," companies specialising specifically in producing selected components as outsourcers for subcontractors. Effectively, Apple designs a processor, sends its project via digital means, and orders its execution to a more technologically advanced subcontractor. An integrated circuit, designed in Cupertino, CA, will be manufactured in Taiwan, and then it will go to the plant in the Philippines or Vietnam, where it will be placed in an iPhone. An assembled phone travels by air to Europe or to Cupertino, where it is sold in hundreds of millions in Apple stores. The semiconductor supply chain is most likely one of the world's most complex and geographically scattered supply chains.

During the pandemics, when shortages rippled through the car market and consequently forced the closure of its plants due to the insufficient number of chips, we quite brutally recognised the critical points of the reigning system. When pandemics outbroke, market prognostications were fatal, and a breakdown of worldwide economic activity was prophesied. However, a course has been drastically changed. Locked down in our homes, learning and working remotely, we sensed an increased need for using various digital services. It induced a global domino effect and increased, in particular, the demand for semiconductors. In the 20th century, oil was the most essential strategic resource – now, it is the microscopic transistors produced in Taiwan. We directly witness global powerhouses fight for control over the pace and direction of technological development, which – from the standpoint of globalists – may prompt the worst-case scenario of a bipolar world, where the USA and China play a vital role, and each country would need to pick a side. From the global trade perspective, such a schism is not good as it hinders humanity's open and balanced progress.

7.
Paradox

Each day, a growing number of people use increasingly more electronic devices to conduct more new activities. The connection between easier production and a broader spectrum of uses of the products arose in the process of mechanising textile production in 19th century Great Britain. More garments that could be processed for varied clothing articles appeared on the market. Surveying this transformation, William Stanley Jevons, a Victorian economist, noticed that the improvement of the industrial revolution's driving force – the steam engine – did not lead to the same expenditure of labour requiring fewer machines but, paradoxically, to the increase of the number of engines simultaneous to the increase of their production and range of uses. Thus, nobody should be surprised that in the times of the fourth industrial revolution driven by the Internet of people, objects, services, and data, this phenomenon, labelled the Jevons paradox, accelerated. The access to more extensive computational power, more significant memory storage, and unlimited data transfer all contributed directly to the increase in electronic devices' production.

The development pace of the digital economy is also facilitated by the phenomenon known as the bandwagon effect. It is defined as the usage increase of a given product or service by an individual if others also begin to do so. It is a rather logical causal relation – the growing number of users increases the chances and possibilities of interacting with a considered solution. The bandwagon effect is prevalent in technologically advanced areas, particularly in telecommunication, where it is pretty challenging to jumpstart a new product as it is initially limited to benefits generated by small groups. Only at the point of reaching the sufficient scale determined by "hooked" consumers do the benefits from that solution increase drastically. That is what elevated to global success and popularity telephones, telefaxes, PCs, and the Internet.

Purely psychological aspects included in Harvey Leibenstein's analysis play a vital role as well – it is important to assume that consumers feel better when they mimic the behaviour of others, which mainly stems from the need for identification with a group. This phenomenon is masterfully implemented by technological corporations,

especially Apple, which presents its products in a way that ignites a cult-like aura surrounding them. A bitten apple has become a marker of status and passcode for entering a community, which, by following the “think different” motto, realises their hidden desire for revolt and rejection of all that is common and instead welcomes what is new, better, and righteous.

From a business standpoint, forging such a myth is exceptionally lucrative. True believers exude faithfulness and gratefulness. Beguiled zealots cease to think critically; they overlook the threats of control they are subjected to – one in which Apple reigns supreme. Its ecosystem has been designed to allow the giant company to decide how its product is used. Source code needed for running apps is fully controlled, and sharing alternative tools that enable using competitive store offers is a potential felony threatening with a sentence of five years in prison and a fine of $500.000.

Such practices are implemented not only with regard to software, but they pertain to the issues of servicing hardware. Tim Cook, the CEO of Apple, repetitively warned the action holders that future profits of the company are threatened by the growing masses of clients deciding to use their devices for a long time and fix them instead of replacing them.

Throughout the years, many famed trials took place when the technological Goliath challenged small repair services. What is more, Microsoft and Google also took the stand and cooperated to impede the laws which would oblige technological companies to provide original parts and schemes to independent services.

In 2021, only in the USA, twenty-seven states considered implementing laws regarding the right to service, but over half of them were rejected. Lobbyists and trade groups representing the largest technological firms violently combat all attempts at regaining the consumer right to assistance, whilst the corporations justify their actions by referring to the fear of damaging devices or hurting those who try to fix them. Luckily, the growing social pressure reverberates. Under the pressure of conscious customers, Apple has included alternative solutions: programmes of independent repairs based on sharing original parts, tools, handbooks, and diagnostic tools with non-authorised services to conduct repairs not covered by the warranty. The programme is free of charge, but certified technicians must perform the repairs, which creates an obstacle for smaller players.

The European Union vigorously works in the area of regulating the surplus production of electronic devices. The surveys preceding the works of the EU Commission regarding a block of initiatives clearly state that two-thirds of the Europeans wish to use their devices for longer, provided that their efficacy does not decrease. In the following years, we may thus expect changes in the law normalising issues connected to producing and processing electronics. New product designs should consider energy efficiency and be subject to conservation and software actualisations. These actions will be supported by a special, mandatory system of grading products based on repair facility and access to particular components. France has already made the first step as it marks all smartphones and laptops with a special scale illustrating the difficulty of potential repairs.

8.
The reduced importance of information

Along with the development of the Internet structures through which we navigate, the form of produced information has changed and become increasingly cheaper to produce and distribute. It eliminated the obstacles which used to function as motivational filters in creating high-quality content. Now, anybody can be a creator. As a smartphone with four lenses lands in your hand, you join a process of habituation to pay less attention to the quality of assessing what and to what degree is digitalised. The Web is deluged with unnecessary content, which blurs access to valuable information and influences the increased demand for computational power, memory storage, and unlimited data transfer, whose maintenance generates massive demand for energy usage.

Not only has the form of transmitting content changed but also communication itself – understood as a process of understanding, exchanging thoughts, and sharing knowledge – which comprises a foundation for relation-building, which has been standardised on a mass scale through communication and information technologies. In front of our eyes, human social networks have realigned, reorganised, and irrevocably connected to technological systems.

The algorithms comprise a key factor in this process of manipulating the flow of provided content. Each of your moves on the Web is, after all, prone to constant surveillance and analysed to offer you a tailor-made set of information. For years, we blushingly gazed at how neural networks achieve superhuman and masterful efficacy in perfect analysis and recognisance of statistical patterns in given data sets. Such comprehension of reality is a type of reckoning based on associations and, as such, is far removed from causal thinking, a basis for human intelligence. At the current stage of its development, a machine cannot grasp the cause of a phenomenon – in fact, they cannot apprehend anything, they only analyse.

Too swift and hasty implantation of AI – with no heed paid to potential ethical and environmental consequences – lead to a situation when ‘unerring,’ autonomous cars cause car crashes, a chatbot becomes a racist, a credit risk calculator discriminates based on gender, and image recognition technology classifies black people as gorillas. It is precisely bots working in such paradigms that are responsible for generating over forty per cent of traffic on the Web. Our attention and focus are flooded with materials with no human element in their creation.

9.
Non-renewable attention sources

Attention, just like the majority of natural resources, has its limits. We reached the times when we are being attacked by uncountable devices fighting for our gaze from all directions. A telephone glued to one’s hand not only decreases our productivity but genuinely influences the changes in our brain structure and even the physiology of a hand.

When your phone notifies you of a new message, you switch from one task to another. Then, two areas of our brain – the parietal and frontal lobes – engage in a tug of war contest. The parietal lobe reacts to distractions, while the frontal one is responsible for upkeeping the focus. If the latter comes victorious, the brain

remains focused, yet deciding what is more important for us also requires some effort. When you open an electronic mailbox filled to a brim, you need to assess the importance of each message. After reading about one hundred emails in a day, eventually, your decision-making skills significantly weaken. Thus, more frequent checking of a mailbox produces stress, overwhelms, and induces anxiety.

Imagine your attention as a mirror of a lake constantly churned by falling drops of notifications detracting from completing the tasks. Even switching between activities requires some cognitive effort and, in consequence, leads to drastic energy depletion.

The Internet can be accessed only through devices that drain the planet and ourselves. We nourished a snake in our bosom, and its shape and construction remain an unsolvable jigsaw for many.

10.
The Internet structure

What is the enigmatic infrastructure of the Internet? In the simplest terms, we can assume it to be concomitant with durable investments in software, hardware, and communicative devices. It also includes human capital such as training, conservation, and all types of support. As it generally happens, it started at a certain point as well. What chain of events pushed humanity towards the development of computer networks? The USSR's launch of Sputnik, the first artificial satellite which revolved around our planet's orbit a few times. Its route touched upon the US territory while remaining beyond the range of territorial defence. The event shook the world.

The only correct answer would be to invest in technical sciences and protection against the new threat. The large sums entailed a wave of engineers and scientists, who – ten years after the technological burst responding to the presence of Sputnik – created the Internet. In the sphere of bilaterality and military, many new technologies emerged. Thus, it should not be a surprise that the Advanced Research Projects Agency (ARPA) bore the Web. The organisation followed the mission of effective usage of computational power. Since, at that time, machine services were remarkably complex, their simultaneous work was challenging to achieve. There was a need for a solution enabling data exchange and sharing results over a long distance.

The existing phone lines came to the rescue – they guaranteed the most stable transfer of digital content, primarily due to the capably working ecosystem of modulators and demodulators, commonly known as modems. For a long time, the effects of that work had been used by the military – until 1983, when it split into military and civilian parts. Universities were a cradle of commercial Internet use. Many students working for the army had been successfully trained in the area of basic operations, and additional funding incentivised the usage of such technologies as a mailbox, file transfers, and finally, a browser.

The Internet has divided its economic activity from the localisations of main research centres exceptionally swiftly and entered its own path with no obstacles in sight. The researchers of telecommunication and politicians avidly discussed the economic geography of the communication network. They succeeded only

in defining the general issues, which were not sufficiently detailed to foresee particular consequences, especially those stemming from the aggressive seizure of the natural environment and acquisition of resources required for meeting the expansion's needs.

11.
Connection at the Ocean Floor

In spite of inspiring visions of radio telecommunication connectors located at artificial satellites of the Earth, ninety-nine per cent of the Internet traffic is based on a deeply hidden, underwater network of suboceanic infrastructure. Along with the spread of devices and activities being done online, we are becoming increasingly dependent on transoceanic reinforcements of digital communication, whose development propels the international business. After all, one click suffices to register a company in Hongkong, send files to subcontractors in India, and settle the successful project through swift international data transfers.

Due to the enormous dependence of the financial sector on the continuous connection provided by underwater cables, their infallibility has been named a key and existential condition for governments and national security – they were labelled as critical infrastructure. The military takes advantage of this situation and avails itself of these facilities for managing long-distance operations. Civilians, individuals, groups, communities, and entire states founding their activity on the supernational exchange of high bandwidth digital data also benefit. As of April 2022, on the map of the world, there were four hundred ninety-free underwater internet cables: active, working, or being built. The variety of these reinforcements is wide and depends on how they are contextualised. Different conditions influence the functioning of a three hundred kilometre cable connecting Azerbaijan and Turkmenistan through the floors of the Black Sea than the ones impacting the one reaching the length of six and a half thousand kilometres connecting the USA with northern Spain. Inconspicuous cables weighing 1.5 tons per kilometre have anchored permanently in the highly complex environment of the Earth. It relates to the hidden labour, economy, culture, and politics, which hold the global systems in check.

The core of an optical fibre is covered in a layer of protective gel, strengthened with plastic isolation, and powered through copper cables; it is sending one hundred gigabytes per second on average, while in its newest forms, it may reach the pace of four hundred gigabytes. How does a massive set of data 'fit' in narrow channels? It is enabled by signal multiplication technologies, which use more than one wavelength for sending information. Longer fibres are intercut with so-called regenerators strengthening the transfer in ca. 70-100 kilometres.

For continuous connectivity, one needs to pay attention to planning and preparing perfect routes for the cables. One needs to avoid volcanic or seismic activity spots or places with mudslides. Natural forces remind us of their might and teach humility, like, for instance, in 2012, when the hurricane Sandy caused malfunctions of a few crucial sections of the transatlantic line, or during the earthquake in Fukushima a year before. What is more, in 2014, a shiver of sharks regularly nibbed on Google's infrastructure, which forced the company to conduct additional investment to dig the cable in special trenches sculpted at the oceanic floor by ploughs hauled by ships – at certain segments, it also needed to be wrapped with the strongest man-made material: Kevlar.

Underwater lines are constantly subject to tensions not only caused by rampant elements but also geopolitical repercussions. It is hard to keep up with them. The US government regularly warns against interference with transoceanic information streams by hostile powers like Russia. Edward Snowden disclosed the practices of the National Security Agency (NSA), which was overhearing communication conducted through optical fibres without scruples. Australia blocked the technological giant Huawei from installing a cable connecting Australia with Salomon Island, fearing Chinese access to the sensitive internal network. The net of interconnections is global, but who is pulling the strings?

The development of optical fibres follows the path cleared by the development of telegraphic and telephone cables, energetic systems, and trade routes. Currently, the lion's share, amounting to two hundred thirty thousand kilometres of cables, is owned by the American corporation AT&T. The second-largest owner is a Chinese telecom (中国电信 Zhongguo dianxin). Often particular segments belong to groups or consortia: technological companies, local government agencies, mixed with other enterprises. This model facilitates the spread of costs but remains problematic and does not stand the test of crises when organisations tend to unload the responsibility.

In the last years, the majority of investments have been financed by Facebook, which currently owns almost one hundred kilometres of cables. Google owns sixty-four thousand – about nine per cent of infrastructure. On the other hand, Amazon invests in developing its private network connecting data centres with cables crosscutting the Atlantic Ocean, the Pacific Ocean, the Indian Ocean, the Mediterranean Sea, and the Red Sea.

Technological giants are famous for depicting the installation of optical fibres disturbing the underwater ecosystems as projects aiding civilisational progress. It is hard to argue that the bandwidth increase and greater accessibility to digital space are the only possible way to maintain their business model aimed exclusively at growth and expansion. It seems that nothing can hinder them. Before 2024, Google and Meta wish to institute the Apricot project connecting Singapore, Japan, the Philippines, Taiwan, and Indonesia. At the same time, the cable connecting thirty-three countries is to be plugged into Africa, with the plan being financed by Facebook. Each day, we tighten the noose of technological domination on our necks.

12.
The Source of Resources

Keeping alive such a progressive vision requires an adequately large amount of resources, mainly metals and minerals, and the growing demand for their extraction jumpstarts the entire array of consequences, starting with the ecological debt incurred from the youngest generations.

Let us consider the example of gold, a beloved sparkling marker of social status. We can stumble upon two types in circulation. The first and the most popular is primary gold mined directly from the deposits. It is estimated that acquiring one ton of this mineral is concomitant with the use of about two hundred fifty tons of water and causes irreparable damage to the exploited terrains. The second type, secondary gold, is acquired by recycling and refining old jewellery, tooth fillings, or electronics.

Production of each mobile phone uses around 0.034 grams of gold, 0.34 grams of silver, 0.015 of palladium, 25 grams of aluminium, and 15 grams of copper. And that is merely the tip of an iceberg. Smartphones contain a whole set of minerals commonly present in the Earth's crust but difficult to extract, like yttrium, lanthanum, terbium, or neodymium.

These elements are necessary to produce electronic devices as they are characterised by their reliability. Gold's resistance to corrosion and superb conduction properties makes it apt for the usage in laboratories where it functions as isolation in the Hubble telescope or in the production of optical fibres, transistor circuits, or semiconductors, which enable smooth functioning of Internet and telephone connection.

What is more, valuable resources may be found in the secondary market, like SIM cards. Twenty-eight thousand small plastic rectangles contain about an ounce of gold. Currently, there exist ca. 1.85 SIM cards per person. It amounts to the staggering number of fourteen billion comprising a potential origin of resources. It is thus not surprising that some home-grown entrepreneurs have begun to create mini-plants in their garages where they drain electronic components in acid to extract golden plates. With regard to Polish law, such activity is illegal.

Urban mining, the process of regaining resources from used products, infrastructure, and other man-made objects, is a valuable source of so-called anthropogenic resources. The used electronic equipment, the products withdrawn or simply thrown away, all contain quantities of copper, platinum, and other noble metals estimated at at least ten billion dollars. From one ton of smartphones beyond their life cycle, one can extract one hundred thirty kilograms of copper and three and a half kilograms of silver. Comparable amounts of valuable ores are melted into computer hard drives and RAM. Their re-usage comprises a vital element of pro-ecological activities to reintroduce non-renewable resources into circulation.

Recently, biological mining gained some popularity as well, using microorganisms for oxygenating metals, which makes them soluble in water and dividable with a solid mass. The huge advantage of this solution is that it is supported by living organisms present in the natural environment, which reduces operational costs and limits the number of greenhouse gases emitted during the process.

13.
Decision is Yours

It is said that curiosity killed a cat. And I have arrived at a similarly deadly position through my hacking tenacity propelled by the need to discover the face of omnipresent digitalisation whose painful consequences have been concealed for many years.

Seeking the truth, I dived to the very bottom of the oceans. At a depth of almost four thousand metres, a deadly silence befell, strengthened by omnipresent darkness, while the pressure increased three hundred eight times over that on the surface. It would seem that in such extreme conditions, only the species hardened by years of evolution may survive. How mistaken I felt when I learned that even at such depths, the presence of scientific and technological thought accelerating the progress of computerisation has manifested.

It targeted hydrothermal vents - oceanic crevasses expelling high-temperature water which, when it comes into contact with the cold ocean, precipitates chemical elements being key elements necessary for the functioning of practically every electronic device.

The vent crevasses are not only a treasury of valuable resources – they are inhabited by mysterious entities like *Kiwas* (yeti crabs), deep-sea *Siboglinidae* (arrowworms), bioluminescent octopuses, and other living beings sourcing live-giving energy from chemical reactions occurring in their vicinity. Scientists estimated that there are around six hundred vents on the suboceanic ridges, each with its unique ecosystem. During exploratory endeavours, it is difficult not to stumble upon a new species; hence these habitats are labelled as 'wealth-laden.' Unfortunately, the significant part is bound for lonely confrontation with persistent machines brought to the bottom and coded by a human with one goal: to seize the vents, divide them into parts, and acquire minerals.

At the bottom of oceanic reservoirs, bar from the impudent plunder of resources, my attention was drawn to the omnipresent construction of optical waveguides, commonly called optical fibres. Their presence stems from relishing in the vision of the entire globe communicated. The obsessive process of realising these plans drove humanity to madness – we squeezed a million and a half kilometres of internet cables around Mother Earth's throat. Each kilometre of the cable weighing up to a ton is a heavy reinforcement which can be framed as a metaphor for chains holding our freedom in check. The global computer network has become a space that enables global surveillance with machines' unlimited computational power to analyse each of our movements and use this knowledge to precisely manipulate our emotions and behaviours.

I found another deadly area at the 2°8'S latitude and 29°8'W longitude. These coordinates indicate the Democratic Republic of Congo. Its territory, deep below the ground, also holds valuable stones propelling the development of the technological environment. It is thus not surprising that China, the USA, and Israel fight for access. When such potent players are involved, widely accepted ethical standards cease to apply. As a consequence, in extraction camps in the Democratic Republic of Congo, the exploitation of child labour in mines and mass rapes of women and girls have become the norm. Depleted by the lack of resources and mass corruption, local authorities cannot keep their population safe. Millions of Congolese men and women go to sleep fearing tomorrow.

When one witness such a great evil, an escape appears to be one of the potential solutions. One should leave behind the world filled with darkness visible in the empty stares of energy-drained people in slave-like relation to technology. It would be best to leave this graveyard and start everything anew, preferably on another planet in a distant galaxy. The privileged groups of technological capitalists represented by Elon Musk, Jeff Bezos, and Richard Branson already do so. Their expansive visions embellished by marketing campaigns yet again divert our attention from challenges stemming from social inequalities.

Unfortunately, even the scenario of commercialising cosmic space becomes less viable with each day. The obstacle that actually threatens human space flights and robot missions is to be found in over thirty thousand elements of orbital rubble – cosmic trash left behind after China, the USA, Canada, and India competed for

dominance in space. It is also contributed by such endeavours as launching Tesla Roadster into space for advertisement purposes.

We cut the roots of our planet and drain it of resources while littering the cosmic space surrounding it. We have been attuned to the acceptance of such 'standards' by the vision of developing the technological environment minted in the hills of sunny California in Silicon Valley. That is the home of conceited ideas disregarding human hopes and needs for the sake of realising the vision of the world consistent with the business goals of privileged social groups – so-called technocracy. A question arises: whether we are courageous enough to gradually break this structure? Or, perhaps, we feel too comfortable in it?

For hundreds of years, for better or worse, we have dealt with the same scenario: excluded majority fights with the privileged minority for freedom, progress, peace, and wealth. Such valiant efforts have variedly ended depending on the lack of access to appropriate tools. Widely available technology of scattered data registers, also known as a blockchain, fills many activists with optimism as it carries the potential to lead us towards constructing new, decentralised structures: partially automated, based on trust and reciprocal cooperation. Hope appeared on the horizon – not everything is already lost.

However, one needs to consider that migrating to transparent databases and their spread can only occur at the cost of end-users connected to the Web – meaning us. Now, all transactions, verifications, and data generated in the process are covered and provided by central units like banks or giant server rooms. The scattered responsibility disseminated among the community which, instead of sucking on computational power from the central cloud, lends it in small bits by exploiting their own devices to be rewarded with digital currency – it is a duet carrying a promise of revolutionising human activity and providing it with a new dimension. However, in the first place, the process requires a significant level of maturity and rejection of all drilled-in conveniences to which we got used in our daily relations with the Internet.

Nonetheless, current trends lead in a completely different direction. Bitcoin, meant to become a pillar of new world order, appeared to be exceptionally energy-costly, and only 0.001 per cent of people hold almost one-third of currency, yet again constructing a dangerous capital accumulation. The digital art market, meant to support artists in regaining copyrights, is deluged with mediocre works. Instead of developing projects facilitating the distribution of universal basic income or verification of supply chains, the community is capable of merely generating ape pictures and selling them in a limited edition.

And now, imagine the world where before any technological solution is implemented in real life, it is tested and graded to assess its potential social benefits, the level of natural resources used for its entire cycle, and its influence on the change of human habits and behaviours. That is the world where we cease to treat technologies as idols – their goal is to care for our wealth and protect the natural environment. Nothing prohibits this vision from materialising – it suffices that while creating the digital space, we will care for all people connected to the Web, treat natural resources with respect, and responsibly realise ideas, remembering that "things we design end up designing us."