1 From Appropriate Technology to Permacomputing: An Executal Glossary of Counternarratives and Practices

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Marloes de Valk (NL) is a software artist and writer in the post-despair stage of coping with the threat of global warming and being spied on by the devices surrounding her. Surprised by the obsessive dedication with which we, even post-Snowden, share intimate details about ourselves to an often not too clearly defined group of others, astounded by the deafening noise we generate while socializing with the technology around us, she is looking to better understand why. She has a strong interest in Free/Libre/Open Source Software, free culture, art and technology. She is a thesis supervisor at the master Experimental Publishing at Piet Zwart Institute in Rotterdam and a PhD researcher at the Centre for the Study of the Networked Image at London South Bank University, in collaboration with The Photographer's Gallery, looking into the material impact of the networked image on the climate crisis.
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T.C. Tangible-Cloud

(T.C.) The digital industry has a big responsibility in the environmental crisis. What kind of damages are they responsible for? How has the rise of the Cloud amplified them? What kind of issues does it fuel?

(M.d.V.) Those are big questions that aren't easy to answer in a few words but in a nutshell the tech industry is responsible for several types of environmental damage that operate on different scales.

Corporations within the tech industry are either in the business of selling hardware or of selling services that require hardware. There is a very rapid hardware upgrade cycle; both on the consumer-side as well as in data centers. All this hardware is extremely polluting to produce, to transport and—at end of an often short life—to dispose of. Even though most tech products are consumed in the Global North, most of these damages are happening in the Global South. The mining for minerals such as cobalt, gold and tantalum, the mining for rare earth minerals and lithium for batteries, the production processes throughout the supply chain and the e-waste processing all leave toxic traces in bodies, soils and water.

Since web 2.0 and the rise of platforms, Software as a Service and its cloud, the tech industry is in the business of selling targeted advertisements, which has three environmental consequences (and many very problematic social and political ones):

First, there is the profiling, the surveillance of people. In order to gather data about a user and to serve them advertisements based on the profiles created with that data (online behavioral advertising), platforms are designed to keep people hooked and engaged as long and as often as possible. On the user-side this translates into the consumption of a lot of electricity and devices to stay online all the time. On the side of the platforms it results in a lot of network traffic; increasing CO_2 emissions, water (for cooling) and diesel (for generators) use and hardware needed to keep the data centers purring and 99.999% available.

Secondly, because of live auctioning of advertisements and the resulting displaying of the winning ad to the user, there is an added layer of network traffic for each page that contains ads. All this extra traffic means extra CO_2 emissions. As a user, you have no control over this. There is no strong do-not-track legislation at this moment. You cannot opt out beyond the "do not track" option in the browser and using an add-blocker, which helps on an individual basis, but legislation to protect people's privacy and limit network traffic would protect people of all species in a systemic way.

To wrap up, the ultimate aim of online behavioral advertising, which constitutes the biggest revenue for the biggest tech corporations, is to make people consume more, which is in turn the biggest driver of environmental destruction. According to the 2020 UN Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) Workshop Report on Biodiversity and Pandemics (2020) the exponential rise in consumption and trade in commodities such as meat, palm oil and metals, largely by developed nations, is one of the main drivers of the destruction of biodiversity. Even if you power big tech's data centers with renewable energy, they are not "clean", their business model at its core is rotten, it can never be sustainable. As Eric Schmidt, former CEO of Google once said in response to Google being called unethical for their use of artificial distinctions to avoid paying billions of corporate taxes in the UK: "We are proudly capitalistic, I'm not confused about this." (Kumar and Wright, 2012).

(T.C.) Your work highlights Big Tech efforts to promote free market capitalism as the best way to address the environmental crisis. They do so by setting up strategies of greenwashing. How do IT companies build their public image? What kind of semantic shifts are at work? How are figures—through audits, accounting and statistics—presented to greenwash IT?

(M.d.V.) ICT corporations build their public image through marketing and PR campaigns. Nothing unusual, but they have an edge: they own the channels people receive most of their news through and therefore have quite some power over the discourse. This is where greenwashing happens at a level beyond a windmill on a sustainability page. One example that struck me is this big semantic shift in relation to tech and sustainability that happened in the past 30 years. ICT, ethics and sustainability researchers Lennerfors, Fors and van Rooijen analyzed this and distinguish three historical phases in the development of the Green ICT discourse: Green Computing, Green IT and Sustainable ICT. (2015)

Their paper discusses how in the early 90s green IT meant making IT itself less polluting. An example is the voluntary Energy Star labeling program of the US Environmental Protection Agency. Around 2007 this shifted to Green IT, in which ICT is no longer seen as the

problem, but is promoted as part of the solution. "Greening by IT" instead of "Greening of IT" (ibid.). Unsurprisingly this phase is not developed by environmental protection agencies, but by industry. The last phase, Sustainable IT, shifts its focus even more, emphasizing the potential of ICT to not only improve sustainability, but also economic and societal issues in the countries that can afford this (ibid.). In practice this means other countries are burdened with the environmental footprint that the production of such ICT involves. There is no real distinction between Sustainable ICT and regular ICT practices. Green ICT can therefore be described as a business strategy used to gain a competitive advantage and its description matches Google, Amazon and Microsoft's "sustainability" practices perfectly.

Other strategies of greenwashing are:

- Blocking or delaying regulations and legislation requiring transparency about supply chains and electricity use by lobbying like there is no tomorrow for voluntary rather than mandatory reporting.
- Creative accounting on sustainability reports by for instance claiming to be 100% carbon neutral by only counting the computers powered by the windmill, but not the rest of the world connecting to that computer and the infrastructures around the world needed for these connections, etc. (de Valk, 2021)
- Focusing PR campaigns on this net zero or carbon neutral element, and away from the business model of selling ads and tech and all that is making our world burn. In this way Shell and BP could also claim to be carbon neutral if they power their offices and trucks with renewables, but somehow the tech industry makes it sound more credible…
- Using government funded green energy projects to power your infrastructure so you don't have to invest anything yourself. Google famously stopped its own renewable energy R&D project RE<C in 2011 because "RE<C would not be able to deliver a technology that could compete economically with coal" (Koningstein and Fork). Google is now buying up renewable energy from projects funded with tax money. Projects that could otherwise power whole cities.
- Data centers are usually not located close to where lots of people see them in any recognizable way. In the Netherlands for instance, the data centers in Hollands Kroon blend in perfectly with the greenhouses around them. There are no visible Microsoft or Google logos. This means it is quite easily overlooked that they exist and burn through millions of liters of diesel to test and power their emergency generators, in case electricity supply is cut. Their presence became most tangible when during a heat wave the water in the region became scarce and journalists started reporting about the gigantic amount of drinking water that was used for cooling, and after use being spilled onto the land, containing polluting chemicals that are meant to prevent bacteria from spreading and calcium depositing in the cooling systems.

(T.C.) Could you put those greenwashing practices in perspective? Are there historical precedents?

(M.d.V.) The historical precedents are manifold. They can be found in any industry campaign looking to dodge public scrutiny, government regulation and taxation. Historical campaigns of the fossil fuel and tobacco industry are prime examples. I've written about this in How to Escape Reality in 10 Simple Steps (2017)[1]. For instance, in a report on climate change from the 80's it was already mentioned that raising taxes on fossil fuels would be a very effective way to combat climate change, yet the industry lobby managed to squeeze in a chapter that challenges this research, arguing against a global fossil fuel tax to diminish emissions (Nierenberg et al., 1983). Research from decades ago showed the same works for tobacco, leading to for instance the founding of The Consumer Tax Alliance (CTA), an anti-tax phantom front-group, created by the Tobacco Institute. The same strategies are applied to delay legislation aiming at improving accountability, making transparency mandatory so people know what is at stake, how damaging an industry is. Why don't our governments use these mea-

sures, proven effective, to help stop the burning of the planet? There could be legislation taxing excessive CO_2 emissions, requiring transparency about supply chains including pollution and labor conditions, transparency about water use, electricity use, waste water disposal and e-waste handling.

(T.C.) In this context, what's wrong with optimization as promoted and deployed by Big Tech? In her presentation, Seda Gürses mentioned the end of general-purpose chips in favor of specialized ones as a mean to pursue the Moore's law[2], thus limitless growth in a limited world. How is, for instance, Edge Computing—a technology designed for saving bandwidth consumption—problematic?

(M.d.V.) The problem is not Edge Computing itself, as a technology, which basically means computing something locally, at the spot where it is needed, rather than at a data center many hops away. The problem is that the type of edge computing that is currently rolled out is not meant to compute locally in order to compute less and reduce the amount of hardware needed, it is meant to accommodate yet another extra layer of network traffic and accompanying hardware. The data center doesn't disappear, there is still centralized control over all this extra computation. Currently it is helping reduce lag on mobile streaming video and gaming, but eventually it is meant to serve the Internet of Things that keeps growing with "smart" objects from cars to coffee makers, from smart thermostats to surveillance cameras. These are all computing locally yet owned and controlled centrally. They represent additional computation, network traffic and eventually … e-waste.
Optimization has always led to an overall increase of resource use, this is called the Jevons Paradox or the rebound effect. This means that optimization is not going to save us. We need to bring overall consumption down by actually reducing consumption, not by making existing consumption more efficient, because well … that's the paradox, we'll just end up using more than before.

Specialized chips play a big role in edge computing as they allow complex calculations required for machine learning (ML) to take place on hardware requiring less power. However, this means this hardware cannot be repurposed and will end up as e-waste as soon as the next generation of chips is out.

(T.C.) In a lecture at the Computing Within Limits symposium[3], you mentioned tech counter-narratives of the 60's and 70's falling into disuse during the 80's neoliberal shift. On the rise of the environmental crisis, some similar movements rise once again. You started to map those movements; what are you mapping exactly and what is at stake according to you?

(M.d.V.) I am mapping counter narratives, telling different stories than Silicon Valley's tech evangelists, with the goal of hearing, connecting and broadcasting a diversity of voices about the future of technology. The Damaged Earth Catalog describes small scale practices related to computing and network technology, that limit their own environmental impact. In the face of the climate crisis and the 6th extinction, a seemingly ever expanding tech industry devouring resources, producing more and more toxic e-waste, draining the energy grid with hyperscale data centers, is triggering some to think through alternatives. I started gathering them in the Damaged Earth Catalog.
Each of the entries tries to give shape to a different role technology plays on a depleted planet; not as a solution but as part of the problem. Feminist Technology, Permacomputing, Collapse Informatics, Benign Computing, Liberatory Technology, Convivial Computing, Small Tech, Low Tech… They counter the idea that access to technology leads to god-like omnipotence; the tool is a means to communicate, express and share ideas, to organize collective action, in a way that is least harmful to the planet. Instead of replacing political action with lifestyle and shopping for tools, tech features as a reason and means for political action. Fully aware of the impossibility to 'solve' truly wicked problems such as the climate crisis with small scale interventions, these practices are a refusal of non-action.

To give one example, Feminist Technology is not related to one specific community of practice, but it has been a field of research and has led to and is still leading to practices that are very valuable in the context of sustainable tech. First of all, it has allowed a broadening of what is commonly understood as technology, and a questioning of positive and negative value associated with so-called high- and low-tech. Judy Wacjman, back in the 90s, described this shift in the association of technol-

ogy with so-called 'high technology'. In Technofeminism, she writes how "male machines" replaced "female fabrics" and tech became more and more associated with masculinity, associated with industrial, governmental, and militaristic practices (2004). This is something that is now more and more reconsidered, also from a decolonial perspective. Western high-tech is no longer seen as universal, beneficial to all.

There is not one single definition of feminist technology, Deborah Johnson argues, because there are many feminisms (2010). There are several elements in feminist thought that are deeply connected to sustainability and which come back in the other glossary entries (Feminist Server Manifesto, 2014; Star, 1990):

- An embodied view of technology and the people making use of it, considering the materiality of hardware and software,
- An emphasis on technology being shaped by, and part of social practices,
- Making hidden labor and labor conditions visible,
- Approaching the everyday as a place of political struggle, the personal as the political,
- Asking who benefits? Looking at who a technology serves and who it harms and excludes,
- Telling stories of power and unmasking false claims of universality: sociologist Susan Leigh Star proposes starting with the zero point; the point in between two dichotomies, with positions that do not fit the standard, thereby entering a high tension zone, which gives insight into the standardized aspects of networks that are stable to most, yet violent to some and stabilized by the invisible work of others. (Star, 1990)
- This point of departure allows us to ask how it could be otherwise. There is nothing inevitable about any science or technology. (ibid.)

For more entries you can visit the Damaged Earth Catalog[4].

(T.C.) Your work session was about creating together an executable glossary. What is this glossary and what do you mean by executable?

(M.d.V.) My work session was inspired by two projects that use language as an entry point to help bring about positive social change. The first is Keywords: A Vocabulary of Culture and Society, from 1976, by Raymond Williams (2017) and the amazing Keywords for radicals: the contested vocabulary of late-capitalist struggle (2016), because of its focus on friction being the productive factor when thinking through different concepts and how there is no "one true meaning" that can be revealed, "the truth", but that shifts in meaning happen continually and looking at these shifts can teach us a lot about how things could be changed, how they can be different.

The second inspiration is the 1977 book A pattern language: towns, buildings, construction, by Alexander, Silverstein and Ishikawa. Not so much for it's faith that this hypertext system will lead to beautiful architecture, but it is inspiring in the way it creates different executable and applicable actions in this web of connections with different scales and layers, allowing users to think through their project from multiple angles. Where it fails is that it will not result in "timeless beauty" per se, only if used by a very talented architect, but the idea to create this network of patterns that can be used to spark and connect ideas is wonderful.

In the workshop we created a deck of cards with ideas on how to make a design, hacking or art practice more sustainable. Each card has a title, a visual representation of the idea and a short description. It is a glossary because each card 'coins' or defines a new or existing term in relation to this theme of sustainable practices. It is executable because each term links to a practice, something that can be done, rather than something abstract or theoretical. This matters because the world is on fire. Next to political action and activism, there is so much work to do, to use less energy, less resources, while still living good lives.

[1] https://schloss-post.com/escape-reality-10-simple-steps-2.

[2] A self-fulfilling prophecy, named after Intel co-founder Gordon Moore who predicted in 1965 that the number of components per integrated circuit would double every year, hence an increase of the speed of computers.

[3] See: https://computingwithinlimits.org/2021/papers/limits21-devalk.pdf.

[4] https://damaged.bleu255.com/

Alexander, Christopher, Ishikawa, S., and Silverstein, Michael 2010. A Pattern Language: Towns, Buildings, Construction. (33 ed.). New York: Oxford University Press.

de Valk 2021. Refusing the Burden of Computation: Edge Computing and Sustainable ICT. APR-JA, 10(1).

Wajcman, J. 2006. TechnoFeminism. Cambridge, UK: Polity.

Williams, R. 2017. Keywords: a vocabulary of culture and society. (New edition, [second edition] ed.). New York, NY: Oxford University Press.

Fritsch, Kelly, O'Connor, Carla, and Thompson, A. K. (Eds.) 2016. Keywords for Radicals: The Contested Vocabulary of Late-Capitalist Struggle. Chico, CA: AK Press.

Intergovernmental Platform on Biodiversity and Ecosystem Services (IPBES) 2020. Workshop Report on Biodiversity and Pandemics. doi:10.5281/ZENODO.4147317 (Pages: 2-3)

Johnson, David G. 2010. Sorting Out the Question of Feminist Technology. In L. L. Layne, S. L. Vostral, and K. Boyer (Eds.), Feminist Technology. (pp. 21–58). University of Illinois Press.

Kumar, N. and Wright, A. 2012. Google Boss: I'm Very Proud of Our Tax Avoidance Scheme. Retrieved from https://www.independent.co.uk/news/uk/home-news/google-boss-i-m-very-proud-of-our-tax-avoidance-scheme-8411974.html

Lennerfors, T., Fors, L., and van Rooijen, M. 2015. ICT and environmental sustainability in a changing society. Information Technology & People, 28, 758–774. doi:10.1108/ITP-09-2014-0219

et al. Nierenberg 1983. Changing Climate: Report of the Carbon Dioxide Assessment Committee. Washington D.C.: National Academies Press.

A Feminist Server Manifesto 0.01. 2014. Retrieved from https://areyoubeingserved.constantvzw.org/Summit_afterlife.xhtml

Star, S. L. 1990. Power, Technology and the Phenomenology of Conventions: On being Allergic to Onions. The Sociological Review, 38(1_suppl), 26–56. doi:10.1111/j.1467-954X.1990.tb03347.x