



Towards regenerative technologies

Position paper

waag  futurelab

Executive Summary

The following statement piece explores how Waag Futurelab plans to counteract degenerative/extractivist attitudes imposed on the wider audience as well as specifically on practitioners in creative fields. With the introduction of the project Designing Regenerative Technologies, it proposes a transition away from a defeatist and tech praising sentiment to one that supports proactive approaches ensuring a liveable planet for humans and more-than-humans.

This article argues for a shift in the way technology is designed, developed, and deployed by describing a three-step plan that Waag Futurelab will undertake with support of partners from critical infrastructure lab (University of Amsterdam), Willem de Kooning Academy (Rotterdam University of Applied Sciences), Greenhost and Zoöconomic Institute. Key contributions include addressing needs of creatives in pursuit of regenerative practices, engaging the public, building a knowledge hub, and fostering systemic change through frameworks such as the Public Stack and Zoöp models.

Introduction

As a society we find ourselves in an uncomfortable spot. We are realizing the impact of our contribution to the environmental crisis, and yet we are also entrenched in systems that make us complicit in its further degradation. It becomes clear there are no quick fixes to this problem. That also means that, since this issue is so expansive and we cannot name a single solution, discussions around this subject often feel exhausted or devoid of tangible action.

Though we collectively grew accustomed to tools, modes of working, and imaginaries that keep us in perpetual circles of dependency on technological expansion, there is also a shared recognition that this status quo is unsustainable. Current tech expansion will lead to depletion of life-sustaining resources, like potable water used to cool down data centers or toxic waste from deteriorating electronics polluting our soil.

Embracing this knowledge allows Waag and our partners to make one more important statement, that **all computational technologies are, by default, extractivist, and there simply is no 100% green tech**. That means that all devices and their use is coupled and dependent on the natural resources. This can only lead to a conclusion that quality of life for humans and non-humans on this planet is directly connected to how technology will continue to be designed, made and used.

Addressing this issue is not an individual responsibility and needs to be tackled at the root. To a large extent the problem lies in our economic system and the tech companies that – more often than not – try to prevent regulation and accountability. While legal and policy initiatives (in Europe) strive to impose social and environmental responsibilities on these corporations, another form of resistance is also taking shape.

Thankfully, there is a growing pool of inspiration from which we can draw. Several groups of artists, creatives and scientists work on regenerative alternatives. As this field continues to grow, Designing Regenerative Technologies is dedicated to working with those who seek to challenge both the perceived and actual role of technology in the environmental crisis.

Waag started the project Designing Regenerative Technologies to spotlight practices that actively and creatively counteract harmful attitudes ushered by big tech companies. To do so, Waag will build on and with knowledge and expertise from our partners at critical infrastructure lab (University of Amsterdam), Willem de Kooning Academy (Rotterdam University of Applied Sciences), Greenhost and Zoöconomic Institute, and work with creatives who, through their practice, emphasize our place in the ecosystem.

1. Silent trade-offs

Before fully embarking on this project, it is worth emphasizing that as an organization, we recognize the ecological crisis at the centre of this problem as rooted in socio-economic as well as technological systems. Tech expansion propelled by unwavering consumerism, encouraged by tech optimists has been a direct cause for the growing economic disparity between people on a global scale¹. Our goals to achieve environmental and social justice are therefore deeply tied to technological dependencies and conditional on whether we are willing to name the harms they bring.

Yet, as a society, we are struggling to address these issues stuck in a seemingly contradictory approach to technology. On the one hand we witness technology being promoted as a tool that will help us innovate and escape planetary crises (e.g. carbon capture and biodegradable electronics). On the other hand, the reality we experience is that mass production and usage of technology exacerbates issues like e-waste, unfair labour conditions, energy consumption, resource depletion and digital colonialism²³.

Meanwhile, in our everyday life, we often resort to lesser evils. Overwhelmed, we still gravitate towards what's easy and accessible: large energy-hungry digital systems like generative AI, and the use of devices that are designed to become e-waste within only a few years time.

This duality might make many people feel conflicted and even defeated. However, we are slowly recognizing that the difficulty of breaking this cycle is not a personal failing, but a direct consequence of the extractivist economy and the immense and pervasive influence of big tech infiltrating places of work, social life and even more explicitly placing a huge claim on scarce resources like land, water and precious minerals. In response, there is growing public pressure and, as of recent years, legal action, forcing tech giants to take accountability. A number of them react by announcing adoption of “sustainable” practices and set targets on tackling climate change.

However, we are now aware that many of these actions often fall short of the promises. Large companies fail to meet their own targets and also routinely exaggerate or misreport their progress⁴, rather than investigating the cause and subsequently cutting down emissions at

¹ <https://itif.org/publications/2022/10/03/inequality-has-been-the-price-of-winning-in-big-tech-thats-changing/>

² <https://www.aljazeera.com/opinions/2019/3/13/digital-colonialism-is-threatening-the-global-south>

³ https://www.researchgate.net/publication/336775102_The_Digital_Divid

⁴ <https://www.bbc.com/news/science-environment-60248830>

their source. Large tech companies have become skilled at co-opting sustainability efforts to align with their business models, rather than risk losing profit to redesign their perfectly optimized operations.

Moreover, the current political attitudes in the world tend to set the tone in favour of tech accelerationism, which encourages technological growth at all cost. For example, in the United States more concessions are made to disregard the impact on the environment in favour of financial profit. Something many tech companies rushed to embrace. What this exposes, is that many of the previous promises, like achieving net zero pollution stated by Apple, Amazon and Meta⁵, are subject to political rather than ecological change.

2. Defining 'regenerative'

Sustainable transformation is often focused on adjusting already existing systems and reduce or avoid negative consequences. "Technologists are great at incremental fixes, but to regenerate entire habitats, we need to learn from ecologists who take a whole-system view."⁶ Regenerative approaches go deeper, attempting to reimagine the system itself.

Thinking in systems is at the core of regenerativity. Practically this means that singular efforts, like installing a green roof or swapping from plastic to paper straws, are not sufficient to be called a regenerative design. Unless they are designed as a part of a larger system that can regenerate resources rather than deplete them. Regenerativity forces us to question the very intentions behind tools and practices we have grown accustomed to. It forces us to understand their impact on a larger scale than immediately visible or felt by us. All current computational technology comes with costs to our ecosystem. And with the current rise of resource intensive computation, like generative AI, the costs are believed to grow exponentially.

We oppose tech optimistic claims that the current technological abuse towards the environment can be fixed by investing more time and resources into more high-tech solutions.

By taking this stance, we avoid the fallacy of promoting green alternatives or green solutions, but rather **highlight tools and practices that expose, counteract, and critically engage with narratives spewed by big tech.**

⁵ <https://focus2030.org/The-impact-of-Donald-Trump-s-presidency-on-international-development-An>

⁶ <https://www.noemamag.com/we-need-to-rewild-the-internet/>

3. Waag Futurelab's take on ecological resilience in three steps

After recognizing that all computational technology carries an extractivist cost, the next step is not to search for a 'perfectly green' alternative but to embrace new ways of thinking that prioritize long-term ecological resilience we can collectively inhabit. This is where alternative approaches to computation, revised assessment methods, and new models of governance come into play.

Permacomputing as a Guiding Principle

It is challenging to oppose the mainstream messaging of tech proponents. The pace with which we are introduced to yet another technological standard is astounding, typically leaving us with little to no time to question its applications before they get widely adopted. We need frameworks that prevent us from following the same ways of thinking and working. To resist this broken dynamic with technology, we must afford ourselves more time and energy to immerse, test, and potentially apply alternative approaches. For that reason, in the Designing Regenerative Technology project, we decided to use permacomputing⁷ as a main guiding principle.

Permacomputing is described as both a concept and community of practice, oriented around issues of resilience and regenerativity in computer and network technology. Its name is inspired by permaculture: an approach to natural resources in which regenerative practices are used to farm food in such a way that ensures wellbeing of other forms of life dependent on the same ecosystem. Such practice invites us to face the scarcity of natural resources and asks us to care for human as well as non-human needs.

While permaculture practices cannot be directly translated to computation, in its essence permacomputing assumes a similar understanding of interdependencies between humans and nature. However, rather than the practice of farming it focuses on the role of technology in the ecosystem. **Permacomputing exposes the tangible impact of tech on our environment and tries to expand collective imagination beyond immediate space and time we experience, allowing us to foresee consequences of unregulated technological growth.**

Practically, this translates to encouraging limiting energy use whenever possible, prolonging the life of hardware to reduce e-waste, avoiding obsolescence by promoting sustainable software built for resilience and accessibility for many years to come, and more.

⁷ <https://permacomputing.net>

Inspired by this approach, Waag will work in collaboration with various creatives who apply permacomputing and similar practices in their work. The goal is to learn from their process, understand where they succeed and struggle, and share knowledge with other creatives who might still be at the beginning of their journey toward alternative working modes.

Updating our methods

While Waag has long explored the intersection of technology and society, integrating permacomputing and adjacent regenerative practices marks a new frontier for us.

Waag has developed the Public Stack⁸, a framework that breaks down technological complexities into more explainable layers. It showcases the values of various stakeholders that shape our interactions with digital devices. The Public Stack is a tool that helps to understand underlying reasons for how technology is designed and the consequences of design choices.

Since technology is constantly evolving, it's an ongoing effort to feature as many defining aspects of the human-tech relationship in the Stack. As we dive deeper into the relation between technology and life on earth, it has become clear that **we need to update the Public Stack by giving ecology and its social dimensions a more prominent place**. Through desk research, physical gatherings and interviews with various creative practitioners, we aim to gain new knowledge on how to practically implement ecological layers in the Stack. Our goal is to stay true to the original purpose of the Stack – making the ecological entanglement of technology clear, compelling, and accessible.

New year, new governance

Beyond the design and implementation of technology, we must also rethink governance structures we apply that will consequently dictate how we use technology in a regenerative way. For Waag, that means looking inwards to find ways in which we can apply regenerativity in our way of working. Waag will experiment with a new governance model, inspired by the rights for nature movement, that will put into question our current practices. By doing so, we clear the path to similar action for fellow cultural organizations.

Waag Futurelab has decided to partner with Zoöconomic Institute and adapt their model called Zoöp⁹. We will work together with a Speaker for the Living, chosen by the Institute. This Speaker for the Living will help to introspect on our, so far, rather human-centred operations. Our ambition is to identify where in Waag's day-to-day operations we can meaningfully accommodate the needs of non-humans: whether it's adjusting our design processes, our

⁸ <https://publicstack.net>

⁹ <https://zoop.earth>

narratives, material use or (big) tech dependencies. We hope to start with small incremental changes to apply as many of our learnings as possible, and if all goes well, be the first tech focused cultural organization to become a Zoöp.

Call to action

This is a call for systemic change. With Designing Regenerative Technologies, Waag maps the ecological impact of technology and creates opportunities for collective resistance. This is an invitation for designers, hackers, makers, researchers and others who critically reflect on their own technological practices and those imposed on them by their workplaces or institutions.

Do you identify with this mission and want to collaborate? Or do you have ideas, resources on regenerativity or relevant existing work you would like to share – get in contact with us!

Or [stay updated via the mailinglist](#)

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