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From growth to scarcity: Can Internet Governance meet the ecological crisis?

Fieke Jansen ★

Internet Governance|environmental justice|industrial policy|power

The world is on fire and our ecological crisis is slowly emerging as a topic on Internet governance agendas. In the growth and progress-oriented technology industry, efficiency measures are proposed to curb the environmental impact of Internet infrastructures. These solutions are too narrow in scope, as they omit to challenge the values embedded within the Internet; the belief in infinite growth, abundance of resources, and the always-on mentality. In this position paper, I argue that to address the ecological crisis head-on, we need to move beyond the relenting infrastructural ideology of abundance and govern from a place of scarcity. The act of centring limits in the governance of Internet infrastructures, I have found, creates new avenues for change and reconfigures the locus of power in the state, market, and citizen nexus. The state is seen as the primary actor in directing the market to serve environmental and societal needs by shaping environmental standards and investing in innovative practices through a progressive industrial policy. This observation requires critical Internet governance scholarship to empirically and theoretically engage with the changing role of the state in infrastructure governance processes.

A relenting Internet ideology

Internet governance scholars have looked at the processes, actors, and fora governing the Internet. This research exposed the intertwinement of counter-culture and corporate interest in the early days of the Internet (DeNardis 2014), theorised about power asymmetries in private multi-stakeholder and multilateral models (Carr 2015; ten Oever 2020), explored the political interest that pushed the concept of digital sovereignty (Pohle and Thiel 2020), and situates policy in the geopolitical race the ensure tech dominance (O'hara and Hall 2018). These scholars show how power relations shifted in the state-market-citizen nexus throughout the history of the Internet. Where North American and Western European companies and governments push conservative modes of governance to keep their vested interest safe and ensure that the global north remains a technological hegemon. These governance dynamics did not materialize out of nowhere, Maxigas and ten Oever (2023) use the concept of 'infrastructure ideology' to theorize how distinct worldviews become embedded in and legitimize specific network paradigms. These network paradigms are Internet, mobile phone, and 5G, promoted by the ideology of openness (United States), mobility (Europe), and smartness (China). In this paper, I look at Internet infrastructures, originated in the United States and legitimized by the ideology of openness, to identify three beliefs that guide Western approaches to Internet governance, that of infinite growth, abundance of resources, and the always-on mentality. After which I will discuss how this ideology limits sustainability solutions to mere market solutions of

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efficiency and optimization. Yet, when we change the underlying values, from growth to scarcity, new avenues for change open up and Internet practitioners look towards the state as the primary power-holder to ensure environmental justice considerations. For this argument, I will draw on both my academic work at the critical infrastructure lab and my work with the Green Screen Digital Rights and Climate Justice Coalition, which has allowed me to engage on the environmental issue of Internet infrastructure in different policy spaces. As such, I will use the term Internet governance in its broadest sense, from observations in engaging in international forums such as the IGF and the IETF to participating in political policy spaces in Brussels and the Netherlands.

A central belief that governs the Internet is that when networks grow, the cost for each new node increases linearly but the value of the network increases exponentially, also referred to as Metcalfe's law (Swann 2002). Thus, the value of an infrastructure, and the services that run on top of it, are believed to be intrinsically connected to its market share and the volume of users, nodes, and data. The capitalist desire to monetize on the value generated by the growth of the network creates a perverse incentive for companies to dominate and control parts of the Internet ecosystem (Srnicek 2017), as we have seen in search, operating systems, and ad tech market. To keep a competitive advantage, companies are continuously searching for new ways to exert their dominance, expand their market share, and grow the value of their network. A market logic guided by the belief in infinite growth, in which the digital is not constrained by scarcity of resources. These dynamics, the centralization of market concentration in the hands of a few companies and the continued search for expansion are very visible in the cloud, in 2024 three companies collectively command over 66% of the cloud computing market (Vailshery 2024). AWS leads with 31%, trailed by Microsoft at 25%, and Google at 10%, and their dominance is likely to continue to grow as these companies offer convenience by renting out computational power to third parties they take away the burden of having to buy, run, and maintain infrastructure.

This outsourcing of computational infrastructure further renders material infrastructures invisible to the end user as it "reinforces a long-standing imagination of communication that moves us beyond our worldly limitations" (Starosielski 2015). The convenience and price with which developers and users can scale up cloud computing capacity dematerializes hard infrastructures, pushing data centres located in industrial zones to the background and making the cloud feel ephemeral and boundless. Only when there is a conflict, what Star (1999) first identified as 'moments of breakdown', do these obscure buildings become sites of political contestation that foreground their drain on land, water and energy supplies. Secondly, the cloud dematerial imagination only can exist as many aspects of mining, pollution, and e-waste are hidden (Liboiron and Lepawsky 2022), happening far away and out of sight of engineers and Internet users. This cultural imagination of dematerialization (Starosielski 2015) feeds the socio-technical imaginary that one can consume the cloud without fearing its depletion. Finally, the always-on mentality relates to redundancy in material infrastructure to assure continuity, reliability, and trust in the network's ability to perform. Here, we can assume that to meet the future expectation

of limitless data storage, computation, and connectivity, data centres are and will proliferate in number, size, hardware, and total energy consumption (Munn 2022). This imagined abundance of natural resources is far removed from the actual strain the Internet has on natural resources in the mining, manufacturing and operations phases.

Emergence of environmental consideration on the Internet governance agenda

There are many ways in which environmental justice considerations intersect with Internet governance debates, this position paper will limit itself to the materiality of the Internet. As of 2024, the environmental harms of the Internet are becoming an emerging issue on several Internet governance agendas. There are working groups, workshops, and panels on the topic at the IETF, IGF, and IEEE, and the European Commission, the White House, and several municipalities are trying to figure out how they can limit its harms. The premise of these governance agendas is that the Internet has a direct negative impact on the environment but holds the promise to transform and make other sectors more sustainable, which will cancel out any direct harm. For example, it is believed that efficiency gains from the Internet and new technologies will reduce carbon emissions in the transportation, building, manufacturing, agriculture, and energy sectors by making them more efficient (Pargman et al. 2020; Rasoldier et al. 2022). There are two dynamic at play in this notion of the Internet as a sustainability tool. The concept of 'false and misleading climate solutions' highlights how direct and immediate harms are ignored while potential future benefits are hyped (Kazansky and Kekana 2023). Promoted by a mode of governance that collapses the political into the technical, where the answer to the ecological crisis is merely a matter of investing in smarter technologies. And the dynamic Alex Steffen calls 'predatory delay', "the blocking or slowing of needed change, in order to make money off unsustainable, unjust systems in the meantime" (McKibben 2018). Predatory delay draws attention to the corporate interest behind these sustainable cloud solutions.

Efforts to reduce the direct harms of the Internet are limited to reducing carbon emissions through measurements, greening, and optimization. The governance community emphasizes the need to develop methodologies and standards to measure carbon emissions and water consumption of hardware components, servers, data centres and entire networks. From the idea that we can not change what we can not measure. Phase out fossil fuels, move towards renewable energy sources, and optimise computational processes by making standard tasks more efficient. The market is seen as the power holder responsible for developing and implementing these sustainability measures. It is important to note that the focus lies primarily on improving the operational and not the embodied costs of the industry, the latter refers to the pollution and resource consumption in the mining, manufacturing, transport, and disposal of hardware (Sutherland 2022; Bridges 2023). These solutions could be considered a first step from the Internet governance community to meet the ecological crisis head on but without fundamentally challenging the three

beliefs that are embedded within 'Western' infrastructure ideology these well-intentioned actions are reduced to marketing propositions. A historical perspective shows that since the Industrial Revolution, technological efficiency gains have not reduced but increased the overall consumption of natural resources, as all usable capital, time and energy are reinvested again and again. This is also known as the Jevons paradox or the rebound effect (Alcott 2005; York and McGee 2016). If we continue Jevons argument to today's technology market, where Internet companies continuously try to expand their market share, these greening efforts will not lead to less but rather to more computing and increased use of natural resources. The emergence of generative AI is a prime example, where excess capital and unused cloud capacity were reinvested in the development of a product that in turn needs even more computing power. Disconnecting environmental harms from our growth and progress-oriented economy prevents structural reform in the Internet and other sectors from happening.

Changing the conversation

The critical infrastructure lab started from a joint interest in how power and conflict become embodied and enacted through communication infrastructures and the observation that our collective Internet imaginaries have run out of steam. Where, predominantly, Western interventions in Internet governance processes are often aimed at protecting the status quo or going back to an imagined past of a free and open Internet (Barlow 1996). The lab position is that these conservative approaches no longer, or never have, served the public interest. To this end, we have been working and thinking with others to co-develop alternative infrastructural futures that centre people and the planet over profit and capital. In our environmental track, a focus has been on developing a data centre policy that is rooted in scarcity. For this, we are mixing interviews with policymakers, civil society, and engineers with participatory action research in policy spaces to gain insights on what an Internet governance approach could look like that is centred on the notions of limits. The proposition is that there are planetary and social boundaries to capitalism and continuing with extractive economic models will ensure that these limits are overshot in the near future, triggering ecological crisis and social injustice. To stay within these boundaries we need to reduce extractive, polluting, and colonial practices and grow alternative economic and social practices that are aimed at redistribution, solidarity, and regeneration. It might seem like a daunting task, as it is easier to imagine the end of the world than the end of capitalism (Fisher 2022), but we encountered that changing the premise, designing in scarcity rather than growth and abundance, allows people to explore demands and practices that would otherwise remain unimaginable in contemporary Internet governance debate.

Preliminary findings of this research approach reveal several shifts in thinking. The first shift is that the limits on land, water, and energy require prioritization, making choices rather than accepting the mushrooming of digital infrastructures. The term mushrooming of infrastructures is used to describe data centres popping up, generally in clusters, near major Internet exchange points. Prioritization raises the question 'What is an acceptable

use of natural resources?', for example, is it desirable to have a Meta hyper-scale data centre that gobbles up the same amount of energy as the entire city of Amsterdam to run the Metaverse or should these resources remain untapped, allocated to run public interest infrastructure or power hospitals. The second shift relates to a desire for stronger state intervention, specifically to develop and enforce an ecological industrial infrastructure strategy. Prioritising companies that give back and invest in the social, economic, and natural environment they operate in and ban those that merely extract, i.e. companies that contribute to the Internet communities' knowledge and skills on how to run (sustainable) infrastructure versus those that hoard this knowledge for themselves. The third shift relates to the state's ability to drive sustainable innovation. In its role as a seed investor (Mazzucato 2011) it can set standards on and invest in ideas such as slow computing, post-silicon computing, or hardware designed for circularity, reducing the need for critical raw materials and mining activities. In its role as a legislator, the state can incentivize the Internet sector to develop sustainable practices by setting and enforcing limits to the total energy and water use of the Internet sector and annually reducing these limits. Finally, a long-standing critique on Internet governance reemerged, who gets to decide how problems and solutions around environmental harms and Internet governance are defined? People in governance spaces are often far removed from the locations and communities where harms materialize, without their expertise these problems get overlooked or flattened and solutions become irrelevant and insufficient at best or harmful at worst.

The need for a stronger state

In this position paper, I explore if and how the Internet governance community can meet the ecological crisis. I start from the premise that if we continue to locate sustainability solutions within the contemporary Internet ideology that is rooted in the notion of growth, abundance, and the need to be always on, we will continue to come up with ways to optimize business as usual and as a result increase the overall consumption of natural resources and worsen the ecological crisis. However, if we stray the course by centring scarcity instead of growth, the solutions become radically different and so are the actors who are believed to be the drivers of change. The state, not the market, emerges as the power-holder in the governance of Internet infrastructures, to ensure that our societies stay within planetary and social boundaries. The desire for a stronger state could be seen as a response to the mismatch between the scale of the problem and the proposed solutions (Liboiron and Lepawsky 2022). When we agree that a problem of a certain scale demands solutions of a similar scale, we fall back on a power holder that can act at that scale, for better or worse the state is often identified as this actor. Traditionally, Western voices have contested, rejected, or reduced the state's role in Internet governance fora. Yet, market and state interests have been intertwined since the early days of the Internet. Mazzucato notion of the entrepreneurial state (2011), draws our attention to its role as the seed investor of the technology industry, and Pohle and Thiel's research on digital sovereignty points to a protectionist state. The state's capacity to manage and direct economic development through its industrial policy, understood

as an overarching framework that guides and combines government spending, investment, soft power, and regulatory focus for a specific goal, becomes an object of study. Future Internet governance research should revisit the state as a power-holder, and critically examine how its industrial policies have up till now been intertwined with the shaping of the technology industry.

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Politics of citation

In this position paper, citations are distributed as follows: female names (5; 22.0%), male names (9; 39.0%), co-authorship female-female names (1; 4%), co-authorship female-male names (5; 22.0%), co-authorship male-male names (2; 9%) and institutional sources (1; 4%). In reflecting on my bibliography, it becomes clear that voices from the Global Majority and racialized scholars are completely absent from this position paper. To ensure that thoughts and voices from these authors are not erased I need to make a conscious effort to decolonize my reading.

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