GLOBAL INFORMATION SOCIETY WATCH 2020

Technology, the environment and a sustainable world: Responses from the global South

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Bigger, more, better, faster: The ecological paradox of digital economies

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The advancement in technology's power and the reduction of its manufacturing costs have created an ecosystem of interdependent digital technologies that underpin digital transformation. According to the Organisation for Economic Co-operation and Development (OECD),[2] this ecosystem will evolve and continue to drive future economic and social change. The ecosystem is currently underpinned by the internet of things (IoT), the next-generation wireless networks (5G), cloud computing, big data analytics, artificial intelligence, blockchain, and high-performance computing – although it is also likely that the technologies that make up the evolution of the ecosystem will change over time.

In front of us, they say, is a revolution. However, it is just as easy to argue that it seems like a new evolution of the same: capitalism has found a new life with digital technologies. In a continuation of extractivist and colonialist practices, this time digital technologies claim human experience as free raw material for translation into behavioural data.[3]

The new "revolution" is called the Fourth Industrial Revolution[4] and for the companies that benefit from it, it does sound like a happy revolt. Now companies can exploit each of our daily steps without even depending on whether or not we turn on our devices: "smart cities" and all our behaviours mediated by "smart devices" (IoT) can be datafied and processed by multiple companies and sold in behavioural futures markets that extend beyond targeted online ads to many other sectors.[5]

But revolutions demand speed. A sense of urgency infects lethargic states that lack ideas to achieve massive social well-being. The initiative in public policy is now dictated by the private sector and, like a breath of help, they demand governments facilitate the "digital transformation". It is a win-win situation: private companies will have infinite data mines (each one of us) and states will be able to have an increase in production and, therefore, better growth figures.

Climate change as a business opportunity

The digital transformation received an unexpected and dramatic boost just over five years ago. On 12 December 2015, at the United Nations Climate Change Conference in Paris (COP21), the parties to the UN Framework Convention on Climate Change (UNFCCC) reached a historic agreement to combat the climate emergency and accelerate and intensify the actions and investments necessary for a sustainable, low-carbon future. Climate change mitigation means that energy consumption must be reduced – primarily through establishing a renewable electricity system.[6]

The Paris Agreement explicitly refers to innovation in article 10, paragraph 5. Furthermore, to leverage the potential of climate technologies fully, the UNFCCC states that it is crucial to innovate and use "revolutionary technologies" in other areas to improve our lives "such as nanotechnology, and blockchains, the internet of things and other information communication technologies."[7] The UNFCCC

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2 OECD. (2019). *Going Digital: Shaping Policies, Improving Lives*. OECD Publishing. https://doi.org/10.1787/9789264312012-en

3 Couldry, N., & Mejias, U. (2019). Data colonialism: rethinking big data's relation to the contemporary subject. *Television and New Media, 20*(4), 336-349; Zuboff, S. (2019). *The Age of Surveillance Capitalism: The Fight for a Human Future at the New Frontier of Power*. Profile Books.

4 Schwab, K. (2016, 14 January). The Fourth Industrial Revolution: what it means, how to respond. *World Economic Forum*. https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond

5 Zuboff, S. (2019). Op. cit.

6 UNFCCC. (2017). *Technological Innovation for the Paris Agreement: Implementing nationally determined contributions, national adaptation plans and mid-century strategies*. https://unfccc.int/ttclear/tec/brief10.html; Lange, S., Pohl, J., & Santarius, T. (2020). Digitalization and energy consumption. Does ICT reduce energy demand? *Ecological Economics*, *176*. https://doi.org/10.1016/j.ecolecon.2020.106760

7 UNFCCC. (2017). Op. cit.

also reminds us that technological innovation must be inclusive and equitable for maximum impact.

According to Rieger,[8] in theory, there are three ways that information and communications technologies (ICTs) lead to dematerialisation (understood as the decreased use of resources). On the one hand, ICTs would lead to dematerialisation by substituting material goods with the virtual, for example, by replacing physical copies of music albums with digital copies. On the other hand, the ICT sector has a lower environmental impact than many other areas. Depending on which economic sectors it displaces, its growth could reduce total emissions for the economy as a whole. Effectively, sustainability has been identified as one of the main benefits of the digital economy, especially in manufacturing processes, where the allocation of resources (products, materials, energy and water) can be done more efficiently based on intelligent management using various technologies.[9]

And finally, the widespread use of these technologies would increase energy and resource efficiency. Moreover, according to the Global e-Sustainability Initiative (GeSI), in a report prepared by the private company Accenture, ICTs can enable a 20% reduction of global CO_2 emissions by 2030, holding emissions at 2015 levels: "This means we can potentially avoid the tradeoff between economic prosperity and environmental protection."[10]

The ecological paradox of the digital economy

However, it is vital to understand that the beneficial effects of ICTs – reducing energy consumption and facilitating the shift towards renewable energy – need to be weighed against the direct detrimental effects of our change to a digital economy. These include the emissions due to increasing the production, use and disposal of ICTs.[11] In other words, we must consider the material cost of the ethereal imaginary of digitisation.

It is acknowledged that the evolution of the technological ecosystem supporting the digital economy is accompanied by a prodigious rise in energy consumption;[12] however, this positive relationship between digitalisation and energy consumption does not hold for all countries and all energy carriers.[13] To meet these fundamental challenges in telecommunications systems and devices, a holistic view called "green communications" has evolved that looks at increasing the whole-scale energy efficiency in communication and computing networks.[14] For example, there are efforts to decrease energy consumption in 5G deployment and data centres, among other technologies.[15]

Although energy efficiency has been increasing in the ICT sector for decades, the promises to reduce energy consumption through digitalisation have not yet been justified. According to a recent study by Lange et al., "digitalisation thereby wrecks its own potentials" to reduce energy demand.[16]

In addition, as recent findings regarding dematerialisation and ICTs in Europe show:

> While it is probable that dematerialization has occurred in specific sectors of the economy – the digitization of music, books, and movies are examples, as well as the rise of telecommuting and teleconferencing and the ubiquity of online shopping – this is still a limited change and it has not had an impact on consumption as a whole.[17]

This paradox produced by the increasing production, use and disposal of ICTs also directly impacts the management of waste electrical and electronic equipment (WEEE), or electronic waste (e-waste). Miniaturisation, device obsolescence, and the enhanced versatility of devices (for example, with the new generation of devices compatible with 5G) have contributed to the redundancy of older devices.[18]

8 Rieger, A. (2020). Does ICT result in dematerialization? The case of Europe, 2005-2017. *Environmental Sociology, 7*(1), 64-75. https://doi.org/10.1080/23251042.2020.1824289

9 Stock, T., & Seliger, G. (2016). Opportunities of Sustainable Manufacturing in Industry 4.0. *Procedia CIRP, 40*, 536-541. https://doi.org/10.1016/j.procir.2016.01.129.

10 GeSI. (2015). *#SMARTer2030: ICT Solutions for 21st Century Challenges*. https://smarter2030.gesi.org/downloads/Full_report.pdf

11 Lange, S., Pohl, J. & Santarius, T. (2020). Op. Cit.

12 World Economic Forum. (2016). *Digital Transformation of Industries: Societal Implications*. https://reports.weforum.org/digital-transformation/wp-content/blogs.dir/94/mp/files/pages/files/dti-societal-implications-white-paper.pdf; Gandotra, P., & Jha, R. K. (2017). A survey on green communication and security challenges in 5G wireless communication networks. *Journal of Network and Computer Applications, 96*, 39-61. https://doi.org/10.1016/j.jnca.2017.07.002

13 Lange, S., Pohl, J., & Santarius, T. (2020). Op. cit.

14 Wu, J., Rangan, S., & Zhang, H. (2016). *Green Communications: Theoretical Fundamentals, Algorithms, and Applications*. CRC Press.

15 Cho, R. (2020, 13 August). The Coming 5G Revolution: How Will It Affect the Environment? *Earth Institute*. https://blogs.ei.columbia.edu/2020/08/13/coming-5g-revolution-will-affect-environment

16 Lange, S., Pohl, J., & Santarius, T. (2020). Op. cit.

17 Rieger, A. (2020). Op. cit.

18 Shittu, O. S., Williams, I. D., & Shaw, P. J. (2021). Global E-waste management: Can WEEE make a difference? A review of e-waste trends, legislation, contemporary issues and future challenges. *Waste Management, 120*, 549-563. https://doi.org/10.1016/j.wasman.2020.10.016

According to Forti et al.,[19] on average, the total weight of global electrical and electronic equipment consumption increases annually by 2.5 million metric tonnes, even excluding photovoltaic panels. Moreover, in 2019, the world generated a striking 53.6 Mt of e-waste, an average of 7.3 kg per capita.

An estimated value of USD 57 billion of secondary raw materials was present (in total) in the WEEE generated in 2019.[20] Urban mining is trying to recover secondary materials and reduce depleting primary raw materials. Nevertheless, this is not always viable, mostly because it produces pollution in the air, water and soil due to effluents emanating from often informal recycling activities. Furthermore, the design of devices to facilitate their later recycling is still a challenge.[21]

The ecological costs of the extraction of raw materials to manufacture the new generation of technological devices, including green technologies, also need to be kept in mind. The political, environmental and cultural conflicts created by "green extractivism", which only deepens the economic gap between developed and non-developed countries, should be a serious indicator of the real costs of innovation, and, even more importantly, who ends up paying the price.[22]

Humans are also part of the ecological paradox in this extractivist chain. The more efficient technologies are, the more humans will be increasingly exploited as raw material, as we are the sources of surveillance capitalism's surplus.[23] The material costs of digitisation go beyond the use of natural resources; they also include human extractivism. However, the consequences of this on the environment are yet to be examined. For now, it can be affirmed that, as part of the cycle of capitalism, the exploitation of our data is partly motivated by promoting infinite consumption in digital economies.

Tech for egalitarian socio-ecological transformation

In line with the digital economy's hegemonic concepts, the climate emergency is a business opportunity rather than an unprecedented crisis produced by the Capitalocene. This has meant that a depoliticised neoliberal vision dominates today's technologies. Their design and deployment seek to solve structural sustainability problems with pure efficiency and productivity, aligning them with austerity policies.[24] The logic of pure extractivism applied to technologies is at odds with any post-human ethical standard[25] and paves the way for horrors such as "Climate Apartheid".[26]

In the urgent times of the Capitalocene, it is imperative to create alternative technologies; but rather than designing hackerspaces or open-source ventures as valuable but individual attempts that falter in the absence of a political horizon, the challenge is for digital technologies to be deployed in a socioeconomic and socio-environmental qualitatively different configuration that is not just "less of the same".[27] In this context, maybe it is time to explore the degrowth project critically.

Degrowth is a radical and egalitarian socio-ecological transformation project that aims to decolonise the social imaginary from the pursuit of endless growth.[28] As Mastini et al. state, degrowth seeks an equitable downscaling of throughput with the consequent guarantee of well-being.[29] Its hypothesis is that GDP can decrease and, despite this, quality of life can improve. From this perspective, capitalism and its economic growth paradigm have led us to a planetary boundary where it is not feasible to reduce carbon emissions as fast as is needed. Also, based on history, degrowth rejects the idea that the deployment of renewable energy alone is sufficient to displace fossil fuels in energy production, given that, for instance, the discovery of oil as an energy source has not replaced coal.

19 Forti, V., Baldé, C. P., Kuehr, R., & Bel, G. (2020). *The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential.* United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR) – co-hosted SCYCLE Programme, International Telecommunication Union (ITU) & International Solid Waste Association (ISWA). https://www.itu.int/en/ITU-D/Environment/Documents/Toolbox/GEM_2020_def.pdf

20 Ibid.

21 Shittu, O. S., Williams, I. D., & Shaw, P. J. (2021). Op. cit.

22 Fuchs, R., Brown, C., & Rounsevell, M. (2020). Europe's Green Deal offshores environmental damage to other nations. *Nature, 586*, 671-673. https://doi.org/10.1038/d41586-020-02991-1; Riofrancos, T. (2020, 28 September) Field Notes from Extractive Frontiers. *Center for Humans & Nature*. https://www.humansandnature.org/field-notes-from-extractive-frontiers

23 Zuboff, S. (2019). Op. cit.

24 March, H. (2018). The Smart City and other ICT-led techno-imaginaries: Any room for dialogue with Degrowth? *Journal of Cleaner Production, 197*(2), 1694-1703. https://doi.org/10.1016/j.jclepro.2016.09.154

25 Braidotti, R. (2019). A Theoretical Framework for the Critical Posthumanities. *Theory, Culture & Society, 36*(6), 31-61. https://doi.org/10.1177/0263276418771486

26 Táíwò, O. O. (2020, 12 August). Climate Apartheid Is the Coming Police Violence Crisis. *Dissent*. https://www.dissentmagazine.org/online_articles/climate-apartheid-is-the-coming-police-violence-crisis

27 March, H. (2018). Op. cit.

28 Ibid.

29 Mastini, R., Kallis, G., & Hickel, J. (2021). A Green New Deal without growth? *Ecological Economics, 179*. https://doi.org/10.1016/j.ecolecon.2020.106832

The degrowth paradigm is still incipient, and much remains to be done, including the critical role that technologies must play there.[30] For the rest, the transition to degrowth needs to be planned as a planetary and participatory effort to avoid structural inequalities.[31] With all its infinite challenges, degrowth can be a concrete stimulus for technologists, civil society, academia, governments and companies to move away from an extractivist logic and shape a sustainable digital economy.

Humanity does not have time to waste. If we want to survive as a species, we need structural innovation. We need to stand in a different threshold, where humans and non-humans, including intelligent machines, can have a solidary coexistence in the face of the challenges of a planet that, whether we like it or not, is already irremediably different.

30 March, H. (2018). Op. cit.

31 Goodchild van Hilten, L. (2019, 27 November). If we want to survive on Earth, it's time to degrow. *Elsevier*. https://www.elsevier.com/connect/atlas/if-we-want-to-survive-on-earth-its-time-to-degrow

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The world is facing an unprecedented climate and environmental emergency. Scientists have identified human activity as primarily responsible for the climate crisis, which together with rampant environmental pollution, and the unbridled activities of the extractive and agricultural industries, pose a direct threat to the sustainability of life on this planet.

This edition of Global Information Society Watch (GISWatch) seeks to understand the constructive role that technology can play in confronting the crises. It disrupts the normative understanding of technology being an easy panacea to the planet's environmental challenges and suggests that a nuanced and contextual use of technology is necessary for real sustainability to be achieved. A series of thematic reports frame different aspects of the relationship between digital technology and environmental sustainability from a human rights and social justice perspective, while 46 country and regional reports explore the diverse frontiers where technology meets the needs of both the environment and communities, and where technology itself becomes a challenge to a sustainable future.

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