

## COMMENTARY

# Frontier Technologies and Digital Solutions: Digital Ecosystems, Open Data and Wishful Thinking

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Arguments to globalise digital ecosystems are emerging, in part seeking to enable a unified approach for global environmental crises. Primarily these calls are being made for increased availability of open data and to facilitate networking of organisations more effectively. It is hoped that by creating more open data then better environmental decision-making will follow, but these propositions tend to operationalise digital solutionism. I argue that, despite these optimistic gestures, it is unlikely that greater data sharing and open digital ecosystems will significantly recast the conditions of the Anthropocene, and that such efforts may even further entrench the conditions of this troubling epoch. This commentary offers a discourse analysis of recent wishful thinking on digital ecosystems from the United Nations Environment Assembly (UNEA 2019) and considers the implications of frontier orientations towards digital technologies and geographies. The frontier thinking that underpins arguments for more integrated digital ecosystems reflects ecomodernist approaches and perpetuates technological solutionism.

**Keywords:** digital ecosystem; digital solutionism; frontier; discourse; United Nations; environment

## Introduction

Digital ecosystems are sometimes positioned as a solution to environmental dilemmas without critical reflection of the environmental costs and benefits of the infrastructure and technologies that produce these systems. Discourses of sustainability with respect to digital technologies include assertions of the benefits of paperless offices and frequently do not shift beyond such positions. At the same time, arguments to globalise digital ecosystems for a unified approach to global environmental crises are emerging that are tied to framings of data as a public good but frequently these tend to operationalise digital solutionism. Rhetoric on the need for greater data sharing and transparency of institution-based knowledge is a part of this push. I argue that, despite these optimistic gestures, it is unlikely that data sharing and open digital ecosystems will significantly recast the conditions of the Anthropocene and that such efforts may even further entrench the conditions of this unwanted epoch.

This commentary offers a discourse analysis of recent wishful thinking on digital ecosystems from the United Nations Environment Assembly (UNEA 2019) to consider the implications of frontier orientations towards digital technologies and geographies. By wishful thinking, I am suggesting that the UNEA is pinning hopes on a future where digital ecosystems are open and transparent,

despite the gap between such a future and the current reality, where massive corporations control important aspects of the production of the digital. The frontier thinking that underpins arguments for more integrated digital ecosystems reflects ecomodernist approaches and perpetuates technological solutionism. Just as the *Ecomodernist Manifesto* (ecomodernism.org: 2015) relies on technological developments to solve political, cultural, economic and social issues that have created the Anthropocene, the UNEA (2019) looks to future digital solutions to fix current environmental issues. Both ecomodernism and digital solutionism capture a sort of humanism (Crist 2016) that is quite limited. It also defers responsibility to act now on the evidence that is already available.

## Context and Methodology

This commentary focuses on a publication by the United Nations that advocates an integrated approach to a global digital ecosystem as a way of providing data to improve environmental conditions: 'The Case for a Digital Ecosystem for the Environment: Bringing Together Data, Algorithms and Insights for Sustainable Development,' a discussion paper by the United Nations Environment Assembly released on 5 March 2019 (UNEA 2019 – referred to as the 'Discussion Paper' in this article). I use critical discourse analysis (Fairclough 1995) to engage with this text. Following Fairclough and Wodak (1997: 258), the benefit of critical discourse analysis stems from how 'discursive practices may have major ideological effects – that is,

they can help produce and reproduce unequal power relations.' This definition is helpful as it doesn't suggest that discourses are beyond or outside social processes, but that they are products of power relations. Combining this position with Foucault's thinking on power – that it is diffuse, contested and discursively produced – allows a reflexive approach to discourses of digital solutionism. For example, Foucault (1980) argues that discourse analysis starts a process that will 'locate the forms of power, the channels it takes, and the discourses it permeates in order to reach the most tenuous and individual modes of behaviour.' This is not in order to establish any greater truth but to establish the 'will to knowledge,' as Foucault wrote, in social encounters.

### Frontier and Wishful Thinking

Planetary thinking defines the Anthropocene as it demands a global perspective on systems of human and environmental change. The Discussion Paper begins with a statement that centres planetary thinking:

The planet is not currently on a sustainable path. In order to change the current trajectory requires transparency, inclusion and accountability. A shift in the global political economy of environmental data is needed to harness the efforts of public and private sectors to jointly generate high quality data and insights as a global public good while avoiding technology and data monopolies. (UNEA 2019: 3)

The opening discursive move here – of not mentioning that humans are the causal factor producing an unsustainable path for the planet – is a concerning strategy that is swiftly followed by a shift in focus to political economy dynamics.

Defining the 'digital ecosystem' is another important introductory moment:

A digital ecosystem can be defined as 'a complex distributed network or interconnected socio-technological system' with adaptive properties of self-organisation and scalability. In this sense a digital ecosystem much like natural ecosystems are characterised by competition and collaboration among its many diverse components. (UNEA 2019: 5)

The second sentence is crucial to the elision of digital ecosystem framing and 'natural' ecosystem functions. Competition and collaboration exist in both, the UNEA suggests, but the actual political economy that shapes those processes in the digital ecosystem are very different to any natural ecosystem. Global technology firms operate differently to other corporations in terms of their reach and accountability (Hoffmann et. al. 2018) and to suggest that competition and collaboration in digital ecosystems mirrors these processes in natural ecosystems is a considerable stretch.

In the Discussion Paper, frontier technologies are foregrounded in the description of how to make a digital ecosystem that works for the environment. For example, from the Abstract:

The global economy is changing and we will not be able to achieve the environmental SDGs or environmental sustainability without utilising frontier technologies and integrated data. (UNEA 2019: 3)

Frontier thinking on digital technologies is linked to environmental goals in this instance, overlooking the already available social and political action that could be taken to address environmental crises. Frontier discourses have traditionally found a place in geopolitical contexts, especially with respect to settler colonial processes. As Flint and Taylor (2000) note, in European imperialist thinking, frontiers mark the division between the 'civilised' inside and the undesirable, so-called Other. The connections between linear modernist thinking and the construction of the digital frontier emerge when we consider the utility of positioning technologies that are not yet in existence as frontier solutions. If technologies are considered as providing answers for current problems at some space/time in the future, then political and ethical decisions and responsibility for present environmental problems are distanced and deferred. Just as the frontier signifies the externally oriented limit of colonial settler societies, in the context of digital technologies and environmental problems, frontier technologies suggest the answer to planetary-scale environmental problems as soon as they are discovered and distributed, at some point in the future. Later in the paper, it is argued that 'A future that leverages the 4th industrial revolution for the environment is ours to imagine and create' (UNEA 2019: 6). By this way of thinking, the future will save humanity, along with the digital technologies that lie there in wait. Frontier technologies are referred to several times throughout the piece and reliance on these as a viable option emerges as a strong theme.

Marginal mentions of environmental impacts of creating broad networks of open data include consideration of the environmental impact of technology and e-waste. The single reference to e-waste involves recommendations for governance processes relating to big data interventions: 'At the same time, such an initiative needs to promote renewable energy solutions across the data ecosystem, address e-waste management and responsible supply chain sourcing, and establish governance processes, safeguards and value-based guidance for disruptive technologies such as big data, blockchain and artificial intelligence' (UNEA 2019: 6). Promoting renewable energy solutions is not likely to be sufficient.

Towards the end of the Discussion Paper, UNEA recognises the paradoxical deepening of environmental dilemmas that will accompany the push for a global digital ecosystem that seeks to share data on environmental measures. 'CO<sub>2</sub> footprint of this technology would contribute to the issues that the proposal is tasked with solving. In 2012, about 5% of the world's electrical energy was consumed by ICT and this released almost 2% of total CO<sub>2</sub> emissions ... This risk calls for energy use and emissions tracking to confirm that the net impact is positive' (UNEA 2019: 22). It is noteworthy that the Discussion Paper includes reference to the carbon impact of globalising the digital ecosystem and that this may be counterproductive

in terms of mitigating global environmental change. But the tracking of carbon emissions will probably not reduce the full range of impacts of digital infrastructure, including the amount of energy consumed by digital technologies, while we know that political interventions and concerted effort to minimise the use of fossil fuels could achieve this end. Measuring the environmental impact of digital technologies is difficult but research is beginning to show the significant cost of our digital technologies (see for example Strubell, Ganesh and McCallum 2019).

The Discussion Paper advocates greater data sharing and a transformation of data from private and contained, to open and public, including promoting connections between the public and private sectors. Synonymous with this is the principle that the digital ecosystem itself needs to be positioned as a public entity: 'It calls for the establishment of a digital ecosystem for the environment as a global public good, governed through an international process backed by the UN as a key tool to monitor the health of our planet and the achievement of the Sustainable Development Goals' (UNEA 2019: 5). A digital ecosystem that is a public good is a worthy aim but likely to be very challenging given the private profit motivations that drive the massive digital technology companies that are dominating the sector (Manjoo 2017).

The Discussion Paper does point out the unintended consequences of extending the reach of platforms to create an integrated global digital ecosystem. It notes that platforms are in powerful positions: 'by having a near monopoly on the ability to process big environmental data, tech firms will face a temptation. While their initial intentions to build data platforms might be noble, once these platforms begin to scale, there may well be a shift to a winner take all [sic] mentality' (UNEA 2019: 22). The political economy of platforms includes the capacity to tap into processes of capital accumulation at the same time as nominally contributing to environmental sustainability, resonating with Barns' (2019) insightful critique of platforms that allow for self-expression of users and communities but also build corporate structures that are extractive and exploitative. It is, at this stage, wishful thinking to suggest that platforms may do anything more than focus on growth, profit and scalability.

### Discursive Digital Ecosystems

The way digital ecosystems are framed in the Discussion Paper operationalises a reductive view of environments and reinforces the digital as a discursive and material solution for multiple environmental dilemmas. For Ash, Kitchin and Leszczynski (2018: 26), defining 'the digital' involves recognising discursive fields: the digital is not just technological, but also relates to 'ontics, aesthetics, logics and discourses.' Ontics refers to having real presences: in this context, the real presences are not yet emergent but lie as frontiers that await discovery. These frontiers are, in a way, more-than-real (McLean 2019) – versions of digital geographies that will emerge in the future. Discourses work to sustain and expand the material aspects of digital geographies, and material and discursive aspects, in this framing, are entangled and inseparable. On this co-production, Gerbaudo (2012) argues that

social movements in digital geographies are forged by agreement and contestation, as multiple voices can contribute to dialogues. In this way, discursive fields are fluid and tenuous in the digital and allow for unification without uniformity.

There is limited crossover in the literatures of sustainability and digital communication, as demonstrated by an exhaustive review of the research by Kuntsman and Rattle (2019). Rather than digital technologies being evaluated for their sustainability, digital solutionism permeates evaluation of the use of digital technologies, where, for example, environmental dilemmas such as the wasteful use of paper are supposedly solved by the use of email. Notable exceptions include Pickren's (2014) political ecology analysis of e-waste, examining the contributions of geographers to the literature on digital waste and critiquing the focus on technical issues relating to waste management – such as those presented by logistics and efficiency. The political ecology lens Pickren (2014: 121) offers includes an appeal for a broadening of the approach to e-waste to consider what the waste produced from digital lives represents, namely 'the more difficult question of the (un) sustainability of the current social, economic, cultural, and political moment.' In an important and related piece of research on digital waste in China, Tong et. al. (2015) discursively unpack policy and practices of managing waste and the limitations of the formal and informal characterisation of recycling. Tong et. al (2015) argue that attention to this aspect of recycling leaves limited space for considering the reuse of resources in China. The adoption of the Extended Producer Responsibility policy that has shaped the European Union's approach to digital waste in China has resulted in a bifurcation of recycling approaches. Formal recycling processes are heavily subsidised by the Chinese government and echo standards of recycling in the EU, while informal recycling processes are more tenuous and involve some risk to those doing the recycling. In cities such as Tianjin, 'scalvagers' are exposed to health and environmental risks from these informal work environments.

Exultation of digital technologies is problematised in Reddy's (2015) analysis of Bangalore as 'India's Silicon Valley.' The discourses circulating around Bangalore's digital technology sector overshadow the practices of digital waste collectors who are largely an informal industry, recycling disposed materials. Reddy (2015: 166) suggests that this may be 'because e-waste recyclers work with obsolete hardware rather than trendy software, their contribution to the city's development and its urban sustainability barely registers in mainstream narratives of Bangalore's transformation into a world city.' An Indo-German-Swiss (IGS) e-waste initiative that was introduced to formalise the recycling of digital technologies in Bangalore effaced the work of making this growing digital industry sustainable, according to Reddy who worked with the IGS group for a period of time and conducted interviews with people involved in the informal recycling industry there. This could be also read as a form of digital colonialism (Datta 2019) as environmentally just processes were clearly not a part of the transition to formal recycling processes.

Smart urbanism literature points also to the tensions that digital technologies (re)produce in urban contexts. Digital solutions are frequently heralded in smart urbanism in a number of ways, extending neoliberal governmentality (Fletcher 2010) of the citizen. Foucault offers governmentality as a way to understand power/knowledge relations in technocratic societies. Institutions, administrative processes, laws, norms and spatial dynamics intertwine to produce disciplinary power that regulates behaviours. People largely self-regulate their behaviours as they are aware of these logics and want to avoid shaming or punishment for transgressions. Environmentality is a particular form of governmentality that involves the regulation of behaviours with respect to environmental issues (Fletcher 2010); for example, environmentality in action is evident when individuals are charged with carrying the burden of reducing their waste production in the absence of government or corporate structures to facilitate such action. Technology, in the context of smart urbanism that employs forms of either governmentality or environmentality, is the primary driver for change (Luque-Ayala 2019) and already existing inequities are either exacerbated or overridden. The gap between the rhetoric of smart cities and their realities is now well researched: Kitchin, Lauriault, and McArdle (2016) summarise these as including the reduction of urban problems to technological problems, and the use of big data measurements that carry biases and flaws but are assumed to be comprehensive and inviolable.

Smart cities research includes consideration of sustainability discourses and theorists in this area argue against techno-solutions. For example, Gabrys (2014) looks at an early example of smart city work as a form of environmentality and concludes that it is a technical solution to political and environmental dilemmas. The sustainability 'innovations' that Gabrys (2014) critiques involve transforming urban citizens into citizen sensors, in turn placing responsibility for achieving environmental sustainability on individuals. These sustainability innovations are akin to the frontier technologies that the UNEA (2019) puts forward as a digital solution to global environmental dilemmas. While calls for sharing of data and accessible digital ecosystems are well intentioned, there are probably going to be high costs associated with deferring action to another time when digital solutions might appear.

## Conclusion

Frontier orientations to digital technologies and their role with respect to environmental dilemmas reinforce problematic human and more-than-human relations. The digital solutionism that accompanies frontier technology thinking obfuscates the practices of over-consumption and extractive industries that have partly produced the Anthropocene. It also reflects ecomodernist thinking that suggests we can use the same technologies and approaches that got us into this inequitable, uneven epoch to move on from global environmental crises.

The optimism behind plans to render data open and available as a public good is salutary but also ambitious, given precedents of corporate control and government

complicity with respect to data management. Last, the Discussion Paper from the UNEA gestures towards better, more efficient use of data from 'real-time' inputs. Again, this may be useful but if this comes without careful and serious assessment of digital ecosystem expansion costs – from the whole lifecycle of digital infrastructure components – then the sought-for gains will be lost in a wave of wishful thinking. Discursive analysis of this text from a leading international organisation shows the normalisation of seeking more technological solutions to political dilemmas.

## Competing Interests

The author has no competing interests to declare.

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