# Power, ecology and diplomacy in critical data infrastructures

April 2023

# Contents

# About

# Executive summary

*This research unpacks the stakes and challenges related to what we came to consider as 'critical data infrastructure', namely the material architecture enabling the internet and, therefore, our societies to function. This report considers broader reflections on future internet governance, considering both dimensions: virtual and material.*

As part of ODI's [Power and diplomacy in data ecosystems](#) project (PDiDE)[1], the research team published three 'provocations' on [data centres](#)[2], [submarine cables](#)[3] and [satellites](#).[4] In this report, we consider how these pieces of internet infrastructure are intertwined with, and involve, the three critical dimensions we decided to focus on: 1) Power dynamics in data infrastructure, 2) The ecological cost of the internet's material infrastructure, and 3) Data as a tool for diplomacy. Highlighting and investigating the physical infrastructure of the internet reveals that:

- The increasing privatisation of an infrastructure that is at the core of the functioning of our societies due to a handful of tech companies, is in contradiction with the initial promise of the internet

- The unequal infrastructural and subsequent connectivity distribution across the world, exacerbates existing power struggles and imbalances as well as strengthening new ones

- The environmental impact of digital technologies and data infrastructure suggests a need to be more responsible with the volume of data created, stored and processed

- Regulatory domains need to consider not just international data sharing but also energy use and environmental harms

- Private sector organisations are pushing for a commerce-oriented future, but alternative futures that better benefit people and the planet, including those envisioned by other organisations, artists and academics, need to be considered

---

[1] ODI (2022), '[Power and diplomacy in data ecosystems](#)'.
[2] Ben Snaith, ODI (2022), '[Data centres, cloud infrastructures and the tangibility of internet power](#)'.
[3] Sasha Moriniere, ODI (2023), '[From cyber to physical space: the concentration of digital and data power by tech companies](#)'.
[4] Calum Inverarity, ODI (2023), '[Beyond the clouds: the role of satellites in data sharing](#)'.

# Introduction

*From April 2022 to March 2023 the ODI's research team undertook a project on [Power and diplomacy in data ecosystems](#) (PDiDE).[5] This project emerged in response to interest in the term 'data diplomacy'. On this basis, the project team began considering how state and non-state actors use access to data – and its corresponding infrastructure – to exert influence within data ecosystems.*

What the ODI refers to as 'data infrastructure' is an assemblage which includes data, code, software, physical sites, standards, protocols, switches, and routers.[6] These structures act as nodes in the network whereby:

> 'data traverses multiple paths from origin to destination, following a packet-switching design in which decisions about the routes of data packets occur through the interaction of devices, internet protocols, and the interests of internet intermediaries at the moment that networks interconnect'.[7]

In this report, we consider how these pieces of 'critical data infrastructure' are interrelated, and how the artefacts we chose involve global dynamics of power, ecology and diplomacy. These serve as the lenses for the analysis in this report, which follows the introduction and methodology sections. We then draw the report to a close with our concluding reflections, which include open questions for further consideration by both ourselves and interested partners.

[5] ODI (2022), '[Power and diplomacy in data ecosystems](#)'.

[6] Fernanda R. Rosa (2022), '[Code Ethnography and the Materiality of Power in Internet Governance](#)'.

[7] Ibid.

These ideas of uncovering the unseen will be followed through the report:

> 'The cloud is in the ocean. It's on the bottom of the sea floor. It goes through deep-sea trenches. It goes through reefs amongst fish. It's subject to undersea landslides. That's where the internet is. The only time that the internet really is in the air is in that last hop when it goes from your router to your computer or from a cell tower to your phone.' [8]

With this in mind, we believe several audiences might benefit from this research and our first-phase findings. These include:

- **Public sector and civil society:** who might gain a greater sense of the pressure points within data ecosystems, which may be informative when considering new policies and data-related relationships, whether in the form of procuring infrastructure or in sharing data.

- **The general public:** who might better understand the material costs involved in maintaining the data ecosystems they participate in.

- **Potential partners for further research:** while we have focused on critical data infrastructure, we have been left with questions as to how access to, and power over, data ecosystems is currently – and could in future – be wielded to influence actors' behaviours and potentially draw concessions.

- **Artists and arts organisations:** artists constantly challenge futures and interrogate present scenarios. Through our research, we recognise the visionary ideas artists have been bringing to these conversations and sharing through their work for decades. This piece will engender further links between researchers and artists to collaborate on the topics. Artists we have consulted and collaborated with through the process are excited and inspired by the ODI's approach and framing.

- **Journalists and thought-leaders:** compelling narratives – and counter-narratives – are necessary to enact change in what we feel have become inequitable data ecosystems. We believe that we have identified opportunities to broaden the discourse around data in more engaging ways to those outside the immediate data community. Our work with the ODI's Data as Culture programme has improved this.

---

[8] CBC Radio (2019), 'Inside the machine: Hidden technologies from sea to sky'.

# Methodologies

*The ODI has previously considered centralisation and decentralisation in data ecosystems, as well as how international regulatory cooperation matters to data in international trade.[9] Combined with the presently abstract nature of the term 'data diplomacy', we decided that an open and collaborative research methodology would be best suited for this work.*

This manifested first in the creation of a public-facing collaborative bibliography[10] containing the key resources used by our team, which informed the primary themes and provided the analytical framework for the project.[11] The team then focused on dimensions of critical infrastructure[12] by creating three 'provocations'[13] on data centres,[14] submarine cables[15] and satellites.[16]

To assist in our effort to imagine alternative, more equitable scenarios, the team formed a partnership with the ODI's Data as Culture programme (DaC), which was commissioned to collaborate with the research team. Working with programme curator Hannah Redler-Hawes and artist Julie Freeman, we were encouraged to adopt alternative thinking around the subject matter and forged new networks, relationships and perspectives. These will inform new artworks and public programming strands and allow thinking around the provocations to reach diverse and potentially unexpected new audiences.

---

[9] ODI (2020), 'Why international regulatory cooperation matters to data in international trade'.

[10] Ben Snaith, Sasha Moriniere, Calum Inverarity, ODI (2022), 'Collaborative bibliography: Power and diplomacy in data ecosystems'.
[11] These themes include: the future of the internet: globalisation v fragmentation; the privatisation of the internet; cybersecurity around data governance; the part and future of the UK in international data governance; the future of data governance and collaboration; cross-border data regulation; technology in global economic competition; digital and data sovereignty
[12] European Commission (n.d.), 'Critical infrastructure'.
[13] At the ODI, 'provocations' are articles where the main purpose is to ask questions and test new ideas, rather than to publish an official position or research.
[14]  Ben Snaith, ODI (2022), 'Data centres, cloud infrastructures and the tangibility of internet power'.
[15] Sasha Moriniere, ODI (2023), 'From cyber to physical space: the concentration of digital and data power by tech companies'.
[16] Calum Inverarity, ODI (2023), 'Beyond the clouds: the role of satellites in data sharing'.

# Artist spotlight:
## 'Allusive Protocols' (2023)

'Allusive Protocols' by Julie Freeman responds to the contradictions and relationships inherent to the PDiDE project. It considers how power is as much about potential, energy, growth and passion as it is about control, authority and influence.

Co-commissioned and funded by the ODI, with the support of the Invisible Dust Forecast 2023 programme.
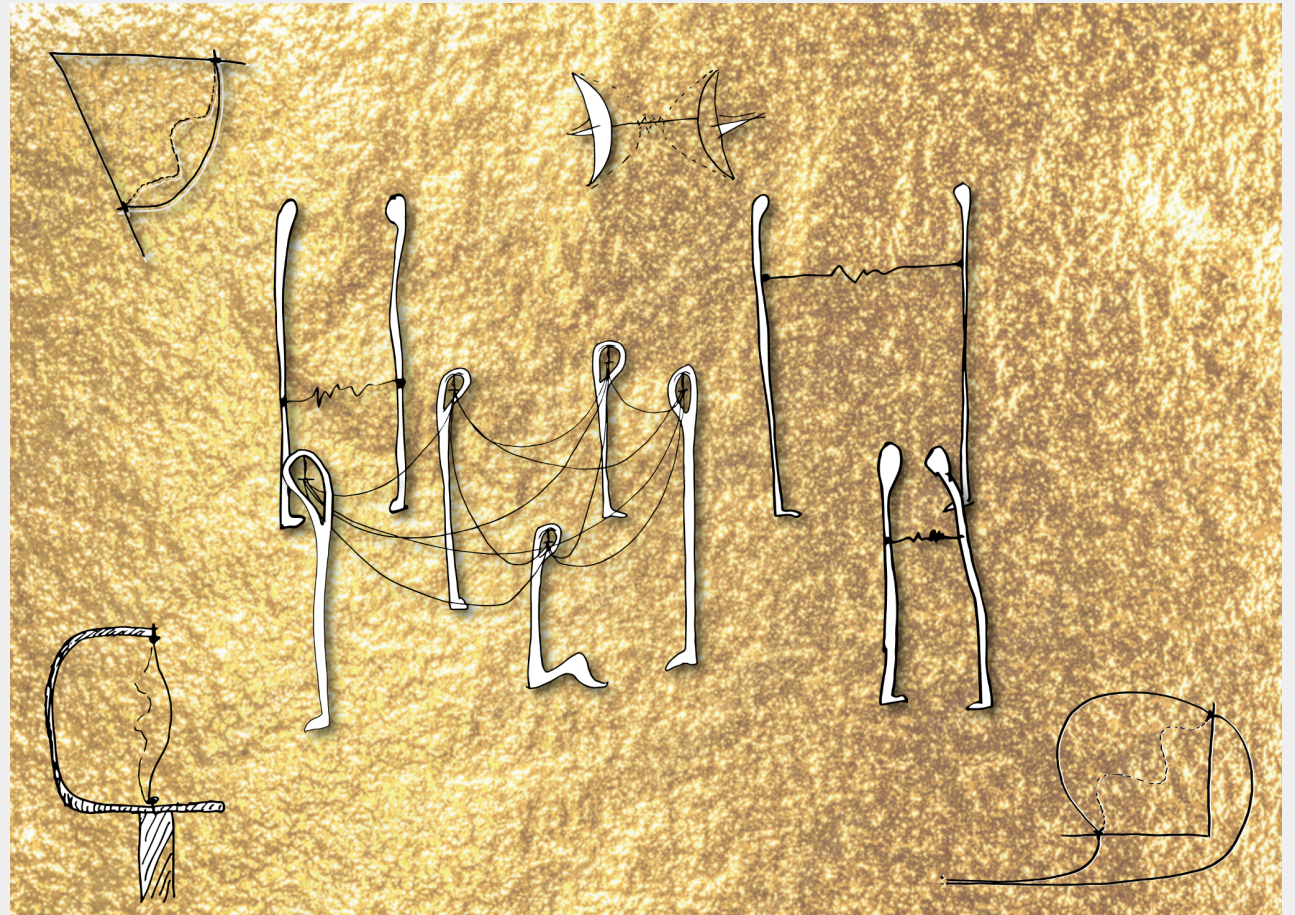


*Julie Freeman 'Allusive Protocols' concept sketch 2023.*

This DaC collaboration and the provocations informed a research roundtable held at the ODI on 21 February 2023, which brought together a collection of domain-specific experts, media theoreticians, interdisciplinary curators and artists working at the intersection of data, technology and art. This roundtable was used to discuss the ideas included in the provocations, elicit critical responses and allow the team to respond to these counterpoints.

This report contains the analysis of the points raised and subsequently investigated as a result of the roundtable.

The ODI team would like to thank those who contributed to the February 2023 workshop, including:

- Carsten Maple, Professor of Cyber Systems Engineering at the University of Warwick's Cyber Security Centre (CSC)

- Christian Bueger, Professor of International Relations specialised in maritime security and ocean governance at the University of Copenhagen

- Iris Long, Curator/Researcher

- Georgina Voss

- Neal White, Professor of Art & Science at the University of Westminster and co-Director of the research centre CREAM (Westminster School of Arts)

- Dr Rob Phillips, Senior tutor Design Products, Royal College of Art

- Zoë Schnegg, Postgraduate Design Student, Royal College of Art

This project has also been made possible through the ODI's multiple collaborations with academic institutions throughout this research, and we are grateful to all those involved. These collaborations include the work of Sofia Hurst from the Imperial College London Science Communication Unit, and of Samantha Fawcett, Anirudh Manchiraju and Micaela Simeone as a result of a partnership between the Duke University Initiative for Science & Society and the Open Data Institute in connection with the University's Ethical Technology Practicum.

# Data as Culture: interdisciplinary art project

The collaboration with the ODI Data as Culture art team stemmed from a desire to explore how we might conduct joint interdisciplinary research to enable new ideas and innovative multi-disciplinary methods, processes and outcomes. We wanted to build on the ODI's decade-long commitment to involving artist and arts-led research to make storytelling and learning devices that increase opportunities for knowledge exchange across sectors.

We believe that a deliberately 'creatively disruptive' interdisciplinary approach is essential to achieving our goals in a complex and abstract enquiry field. We wanted to invite previously unimagined – and potentially unimaginable – thinking, approaches and outcomes which recognise the unique qualities of networked culture and infrastructure and the roles ethical and equitable data play across these.

We decided that embedding an artist (Julie Freeman) and an interdisciplinary curator (Hannah Redler-Hawes) in the research team would maximise creative opportunities.

Our first goal was to try to develop a shared language. As distinguished figures in the UK field of art, science and technology, data and society, with long track records, Julie and Hannah were able to share their practice and that of other leading thinkers from art history and media theory. Together these ensured critical questions about our research themes (that artists have been asking for decades) were considered in the project context.

We looked at their past curatorial and artistic projects, including Julie's pioneering artistic research into data as an art material and Hannah's curatorial outputs, such as 'Hybrid Landscapes', curated for the UK Digital Catapult and 'The New Observatory' for FACT Liverpool, which she co-curated with Sam Skinner. 'Hybrid Landscapes' featured artworks exploring how lived experience plays out simultaneously across natural, built and networked worlds. At the same time, 'The New Observatory' brought together an international group of artists whose work explores new and alternative modes of measuring, predicting, and sensing the world through data, imagination and other observational methods. Selected works from these exhibitions and Julie's own work are featured in this report to demonstrate the pioneering research of artists in these fields.

As we identified subjects for our research, the art team contributed to our sifting and selection process helping to funnel down into the final topics, which became the three provocations on data centres, subsea cables and satellites.

The focus of our art programme has been to keep coming back to the humans at the heart of emerging data ecosystems and landscapes; in this project, we acknowledged that this needed to expand to all living things. We have been galvanised by the project's focus on recognising that choices have to be made to ensure the resources our future internet(s) rely upon are not depleted or damaged by counter-productive unchecked consumption or ill-considered 'progress'.

# 1 –
# Power dynamics in critical data infrastructure

*How the wielding of power by a handful of actors is altering global territories and relationships.*

Within the global data ecosystem, some organisations, companies or governments have concentrated considerable power. In light of this, we need to consider how actors are trying to gain, wield, or erode power by using critical data infrastructure as a tool of coercive diplomacy. The premise of this reflection contradicts the original, utopian idea of the internet – which envisaged that power would be broadly spread throughout the network in a decentralised manner, and thus be equitable.[17] Our primary focus here is to understand how the analysis of the internet's physical infrastructure reveals global power dynamics and imbalances worldwide.

We would not be able to send text messages, upload images or videos, or use social media, if it was not for the complex infrastructure that has become so critical to our economies and the functioning of our societies. The internet is both virtual and material. And its materiality is often analysed and considered far less than its virtuality.[18] [19] To make the most of the data circulating worldwide, we need to consider both dimensions.

[17] Barry M. Leiner, Vinton G. Cerf, David D. Clark, Robert E. Kahn, Leonard Kleinrock, Daniel C. Lynch, Jon Postel, Lawrence G. Roberts, Stephen S. Wolff, COMMUNICATIONS OF THE ACM (1997), 'The Past and Future History of the INTERNET'.
[18] Steven Gonzalez Monserrate, Wired (2022), 'The Infinite Cloud Is a Fantasy'.
[19] Christian Bueger, Tobias Liebetrau, CONTEMPORARY SECURITY POLICY (2021), 'Protecting hidden infrastructure: The security politics of the global submarine data cable network'.

# Artist spotlight:
## Powerful predictions

Burak Arikan's revelatory self-portrait exposed how much the artist divulged about himself through his spending patterns over two years. It raises questions about the data trails we create, their potential value to others and the power relationships that emerge.

Featured in 'The New Observatory' exhibition, 2017. A collaboration between the ODI and FACT Liverpool.
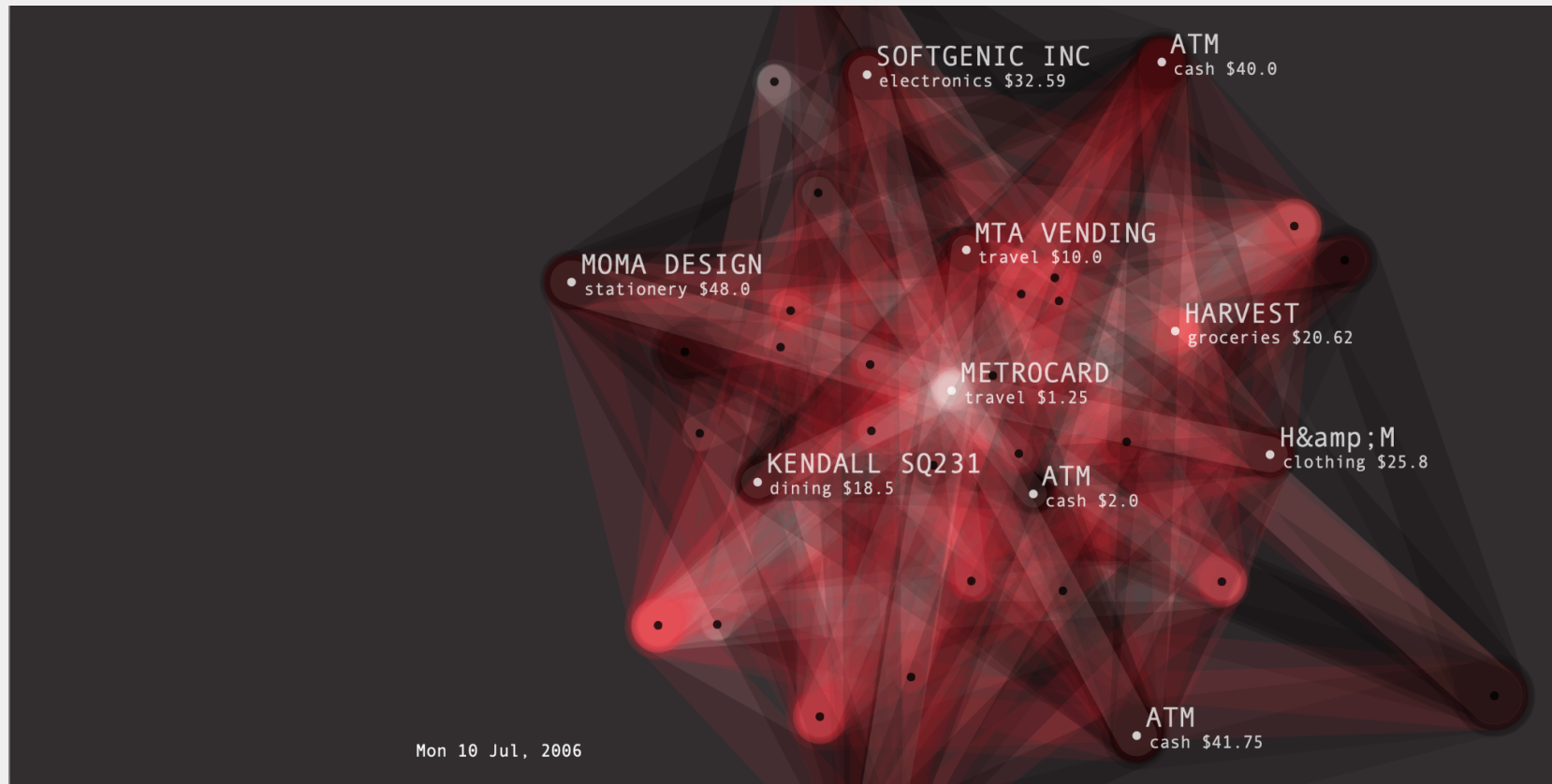


*Burak Arikan 'MYPOCKET' (2008).*

# The not-so open internet

Just like our physical infrastructure[20] – such as rail transport, roads, planes, and energy – critical data infrastructure is owned by a range of groups.[21] The private sector builds and owns most of the aspects of the internet, from cables and data centres to platform services. In applying market ideas to cyberspace, Utrecht University Professor José Van Dijck states the following:

> 'In the 'Rhineland' model [of social-market political economy], you have the state, you have the market and you have civic society [...] But in the digital space right now, there's only privatised, market space. There is no public space and there is no civil society.'[22]

Ideals of openness and free knowledge drove the initial promise of the internet to shape more democratic, just and free societies. But the open revolution did not happen.[23] The emergence of market logic in the digital realm and the progressive empowerment of private companies has significantly transformed data ecosystems from the way they were first conceived.

In recent years, a handful of private companies have exerted their outsized and unprecedented influence over cyberspace, primarily by consolidating algorithmic power,[24] but now they are also conquering the physical infrastructure of the internet[25] by creating an infrastructural monopoly on a global scale.[26]

Amazon, Google, Meta, and Microsoft hold over half the world's hyper-scale data centres,[27] and by 2024, these and similar companies will possess more than 30 long-distance cables connecting every continent.[28] As this infrastructure is increasingly critical, and allows us to stay informed, we are reliant on a small number of actors that appear determined to consolidate more and more information power.[29]

[20] Ellen Broad, Jeni Tennison, Gavin Starks, Anna Scott, ODI (2016), 'Who owns our data infrastructure?'
[21] Ibid.
[22] Pete Swabey, Martin Harraca (2021), Digital power: How Big Tech draws its influence, TechMonitor.ai.
[23] Paul Keller, Alek Tarkowski, Open Future (2022), 'The Paradox of Open'.
[24] Pete Swabey, Martin Harraca, Tech Monitor (2022), 'Digital power: How Big Tech draws its influence'.

[25] Sparky Abraham, Current Affairs (2020), 'A Series of Tubes: Reclaiming the Physical Internet'.
[26] Sasha Moriniere, ODI (2023), 'From cyber to physical space: the concentration of digital and data power by tech companies'.
[27] Dan Swinhoe, Data Centre Dynamics (2021), 'Microsoft, Amazon, and Google operate half the world's 600 hyperscale data centers'.
[28] Geert van der Klugt, Techzine Europe (2022), ''Big tech conquers internet infrastructure, wipes out telco providers''.
[29] Internet Society (2019), 'Global Internet Report 2019: Consolidation in the Internet Economy'.

## Artist spotlight:
# Living infrastructure

Julie Freeman's 'living' installation that is powered by microbial metabolic actions that generate electricity from liquid human waste to collect data about the system itself. It comments on the need for alternative power systems and the impacts of digital technology on our resources.

Supported by KU Leuven and ZKM.



*Julie Freeman, Ioannis Ieropoulos, Rachel Armstrong Active Living Infrastructure: Controlled Environment (ALICE) 2.0 2023 (installation shot).*

Data centres, submarine cables and satellites are increasingly becoming 'smarter', not only carrying vast amounts of data, but being designed to create their own data. For example, some of the subsea cables being built by the Subsea Data Systems, Inc., a partnership between Samara/Data and Ocean Specialists, Inc. Science Monitoring And Reliable Telecommunications (SMART) could:

> '... marry commercial cables carrying regular internet traffic with sensors that could provide researchers with critical information about the status of our oceans and provide an important new source of ocean and climate data'.[30]

The repeaters built into those cables could also help detect seismic activity. This will further raise the question of ownership: what happens to the data produced by the data cables if they are owned by only a few technology companies? This ownership and presence in both the virtual and the physical world give these companies an additional economic and political advantage.

Governments must consider, firstly, whether investing in public data infrastructure fits their economic ideals, and secondly, what this investment would look like. Mirroring the debates in other sectors, governments have to contend with the dynamics of public or private ownership. Will they invest in developing and maintaining public data infrastructure, or rely on the capacities of private organisations? Currently, data and digital skills are concentrated overwhelmingly in the private sector,[31] which can lead to tricky situations where states depend on private tech firms to provide fundamental parts of their data infrastructure.

For example, the controversy around American tech firm Palantir's involvement with NHS data.[32]

In reaction to the commercial ownership of such critical infrastructure, national and local governments think, advocate for, and establish public broadband in some parts of the world – by giving internet access to marginalised communities. For instance:

> 'Nowhere is this more evident than in the United States, where in recent years more than 800 communities have established locally owned broadband networks (of which around 500 are publicly owned)'.[33]

Economists describe a 'public good' as having two attributes: non-excludability and non-rivalrousness. The former means that a noonly a few technology companies own them, and the latter means that the consumption by one person does not reduce it for others.[34] In that respect, we could say the internet is a public good, even though it is privately owned.[35] If Elinor Ostrom's idea of 'the commons'[36] was not referring to the internet in particular, but rather to different forms of social organisations collectively, taking care of shared resources, we can't help but find examples of 'commons', as she defined them, in the digital realm, for example Wikipedia, the Internet Archive (historical Web artefacts), and other open data and collaborative initiatives.[37] [38]

---

[30] Dan Swinhoe, Data Centre Dynamics (2022), 'Making subsea cables smart, and helping save the planet'.

[31] Emma Thwaites, David Dinnage, Matt Davies, ODI (2022), 'Data Decade: Data and public policy'.

[32] Jon Ungoed-Thomas, The Guardian (2022), 'Controversial £360m NHS England data platform 'lined up' for Trump backer's firm'.

[33] Thomas M. Hanna, Open Democracy (2019), ''Broadband communism'? Outside the UK, public broadband is a raving success'.

[34] Veeshan Rayamajhee, Pablo Paniagua, King's College London (2020), 'Elinor Ostrom and the Contestable Nature of Goods'.

[35] Bob Frankston, CircleID (2022), 'The Internet as a Public Good'.

[36] Elinor Ostrom, Cambridge University Press (1990), 'Governing the Commons. The Evolution of Institutions for Collective Action'.

[37] Ben Snaith, Jack Hardinges, Joe Massey (2021). The Data Institutions Register. The ODI.

[38] David Boiller (2009). Elinor Ostrom And The Digital Commons. Forbes.

However, the whole physical infrastructure of cyberspace, is far from being 'common' in Ostrom's sense, and is not treated as a common resource to be collected and managed by a wide range of actors including private, state, civil society, and international organisations. This private network control of the digital architecture/ infrastructure – data centres, undersea cables and satellites – has significant consequences for how the internet works globally, and reveals a map of major geopolitical (im)balances in the international structures of the internet.

# The distorted dynamics of internet ownership

The power concentration happening in the digital realm has led to the unequal distribution of digital resources and infrastructure worldwide, exacerbating existing power dynamics and creating new ones. Digital infrastructure reveals poorly distributed power hubs across different geographies:

- Even though this is progressively changing, undersea connectivity cables are concentrated in the Atlantic ocean. [39] So 49 out of the 265 submarine cables in service across the world are connected to the UK territory.[40]

- For the location of data centres, we observed that economic and political power centres attract providers to establish internet infrastructure, which in return contributes to further strengthening those hubs. It is, therefore, not surprising that Chinese and US large enterprises are the main hubs for attracting hyper-scale data centres as they aim at ever-growing market dominance.
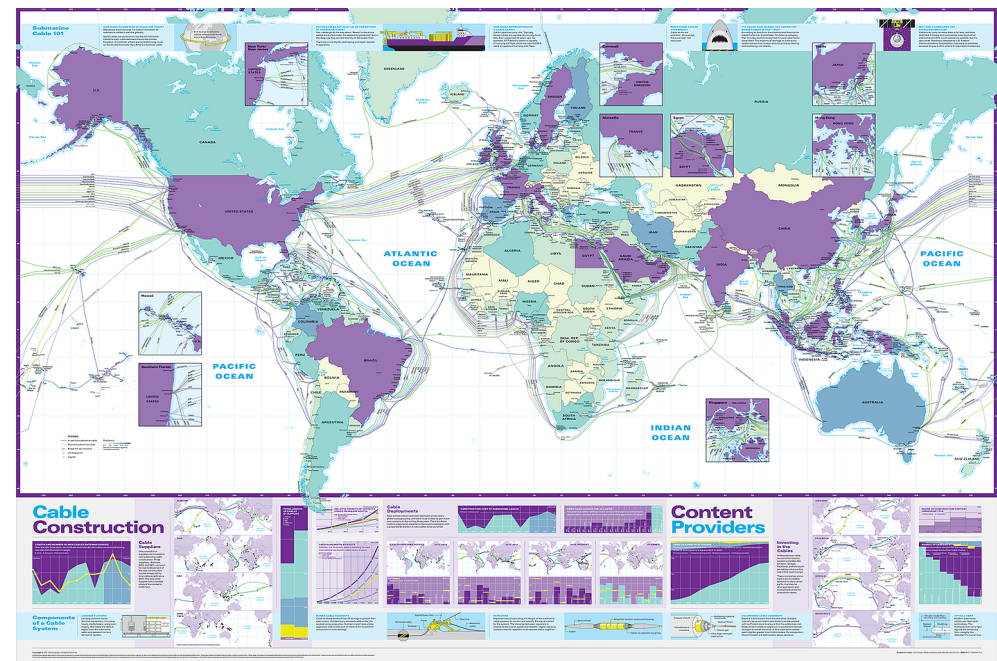


*Figure 1: Global Submarine Cable Map (Source: Telegeography)*

---

[39] ShinJoung Yeo, University of Illinois Press (2023), 'Behind the Search Box: Google and the Global Internet Industry'.

[40] Maxime Vaudano, Le Monde (2022), 'Les câbles sous-marins, clé de voûte de la cybersurveillance'.

# Singapore's digital infrastructure

This year at the ODI, we hosted Sofia Hurst, on a placement from Imperial College London's Science Communication Unit. She produced a briefing on Singapore's digital infrastructure, which included the following insights:

- Singapore's stability, higher security values, and business culture, makes it a preferable choice for large core systems over its neighbours. Singapore has 78 data centres on the island.[41]
It is connected to international fibre networks which make it excellently connected to most of the world.

- Singapore ranked 1st in broadband speed globally at 230.22Mbps for a second year running, in 2022.[42] Facebook serves its Asian users primarily from Singapore, where it has built its only data centre east of Sweden, but companies such as



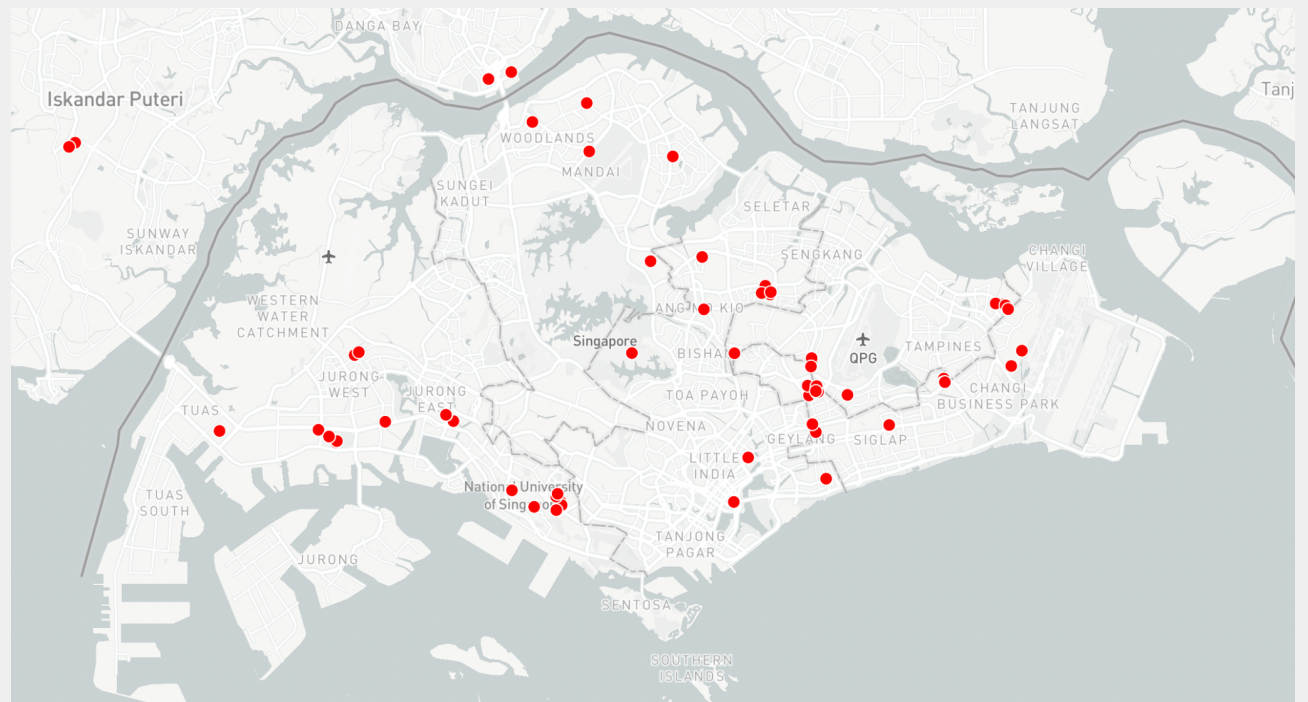*Figure 2: 'Southeast Asia Data Centre Market' (Source: Baxtel)*

- Amazon are a little more diverse in how they ensure coverage of the region.

- Singapore also sells itself as the landing for many major undersea fibre cables[43], with more in the works.[44]

The centrality of Singapore in digital terms makes it a critical gateway to the internet and its infrastructure in Asia. It is an interesting hub where US and Chinese tech companies are established and tech projects flourish. For example, Microsoft is building a sovereign cloud for one of the government agencies.[45]

---

[41] Baxtel (n.d.), 'South East Asia Data Center Market'.

[42] Aaron Raj, Tech Wire Asia (2022), 'Why is Singapore a top ideal market for data centers across the globe?'.

[43] TeleGeography (n.d.), 'Submarine Cable Map - Singapore'.

[44] Laura Dobberstein, The Register (2022), 'Construction starts on another Asia-Europe undersea cable'.

[45] IT pro (2022), 'Podcast transcript: How Singapore became a data centre powerhouse'.

The dynamics of investment in digital infrastructure – and data extractivism[46] – reflect historic colonial relationships and are increasingly visible and analysed in the digital realm. The notion of 'digital colonialism' was defined by Yale University's Visiting Fellow Michal Kwet as 'when American and other Western multinationals exert control over the global South by concentrating digital power into corporations: a form of tech hegemony'. This hegemony is utilised as

> 'ICT companies exert control by fact of the majority of software, platforms but also physical infrastructure are if not U.S. based, U.S owned through giant tech companies: web browsers, search engines, streaming sites, data centres, undersea cables, etc.'[47]

As we become more digitised globally, we become more dependent on a handful of private actors, almost all located in the US.[48] But actors and decision-makers from civil society – researchers, policy officers, activists – across the world are advocating breaking away from dependence on US tech companies, setting up and strengthening a new, autonomous and sovereign internet infrastructure.[49] We refer to digital sovereignty as a 'nation's ability to control its digital destiny', which 'may include control over the entire AI supply chain, from data to hardware and software'.[50]

# The geopolitical faultlines of internet power

The physical infrastructure of the global data ecosystem is subjected to the same geopolitical structures, power concentrations and competitions that exist in the offline world. Indeed, the infrastructure could be used as a geopolitical lever in the global competition for power. The example of Taiwan, particularly the archipelago Matsu, which saw its submarine cables being cut 27 times in the past five years,[51] exposes a tense political climate between the island and China. It is extremely challenging to clearly attribute such an action to a state, and therefore, this impunity can be a vulnerability to be exploited. The physical infrastructure could become a lever in conflicts or historical geopolitical rivalries and tensions.

These pipelines, wires, storage units, and routers carry data; by securing the physicality of the internet, those commercial actors are securing the flow of the data passing through this infrastructure. For example, private companies control the purposes for which data is allowed to circulate through Starlink and create dependencies and over-reliance on this system by setting up rules without influence or oversight from other actors. The recent example of SpaceX restricting Ukraine's access to Starlink satellite broadband for 'offensive purposes'[52] raises questions about whether it is legitimate for these private actors to 'legislate' on who has access to the internet or not, especially during crises or conflicts. This example showcases the power of these commercial actors and the subsequent dependencies that this concentration creates. It is questionable whether Starlink providers should have the right and legitimacy to decide if Ukraine can access its network, and suggests we should

---

[46] Nick Couldry, Ulises Ali Mejias, Information, Communication and Society (2021), The decolonial turn in data and technology research: what is at stake and where is it heading?

[47] Meital K., Jason M, Pollicy (2022), 'Language & Coloniality: Non-Dominant Languages in the Digital Landscape'.

[48] Vili Lehdonvirta, The MIT Press (2022), 'Cloud Empires: How Digital Platforms Are Overtaking the State and How We Can Regain Control'.

[49] Ryan Morrison, Tech Monitor (2023), 'The UK needs more compute power, but must end its addiction to the US cloud hyperscalers'.

[50] Benjamin Cedric Larsen, The Brookings Institution (2022), 'The geopolitics of AI and the rise of digital sovereignty'..

[51] Rachel Cheung, VICE (2023), ''A Warning Sign': Chinese Ships Accused of Cutting Off Internet to a Taiwanese Island'.

[52] Calum Inverarity, ODI (2023), 'Beyond the clouds: the role of satellites in data sharing'.

interrogate the potential ability Google or Meta could have to decide to cut a country or a company's access to a data centre or the data carried by submarine cables. In early January 2021, Amazon Web Services (AWS) suspended the far-right associated social media app Parler's access to its cloud computing services, citing violations of its terms of service related to content moderation and hate speech.[53] The fact that one technology company can deny access to a particular service further demonstrates the special power that certain private companies have over internet infrastructure – for better or worse.

As technology progresses faster than governance and legislation, state actors and civil society are often routed away from power:

> 'The choices and arrangements at play are barely known to the public, as they happen at the discretion of private actors, but the social, political, and economic implications they generate suggest that new ways to understand these flows of information online should be considered, especially in light of the pervasive commodification of personal data and the historical inequalities rooted in colonialism that mark the divide between the global North and the global South.'[54]

Therefore, the commercialisation of sea, land and space regarding the internet creates tensions around key aspects of international relations, including democracy, diplomacy, and ecology.

---

[53] Jack Nicas, Davey Alba, The New York Times (2021), 'Amazon, Apple and Google Cut Off Parler, an App That Drew Trump Supporters.

[54] Fernanda R. Rosa, Springer (2022), 'Code Ethnography and the Materiality of Power in Internet Governance'.

## Artist spotlight:
## **Investigating our environment**

Citizen Sense created a series of low-tech air pollution data collectors housed in a bespoke ceramic case. They were available to residents of Deptford in London, England, to borrow free from local libraries. Each Dustbox streamed real-time data to the online platform citizensense.net to monitor disconnect with reported and experienced pollution levels.

Featured in 'The New Observatory' exhibition, 2017. A collaboration between ODI and FACT Liverpool.
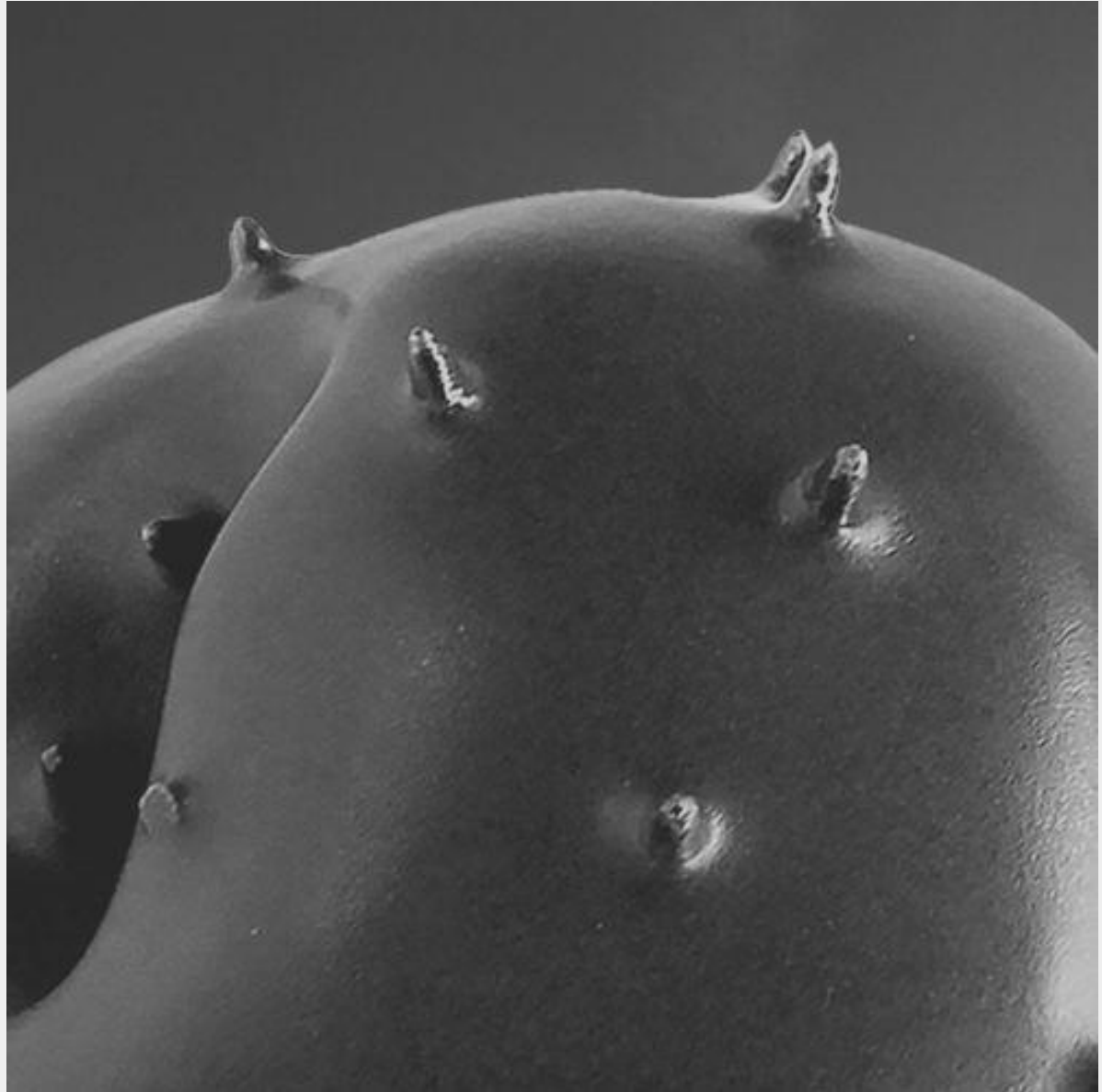


*Citizen Sense 'Dustbox' (2016-17)*

# 2 —
# The ecological cost of the internet's material infrastructure

*How a data-driven world is inherently connected to the natural world*

Internet technologies exist on temporal, spatial and material planes. This means that we need to consider:

- how the infrastructure is designed to last over a long period of time (an undersea cables' lifespan is approximately 25 years)[55]

- where these technologies are located and subsequent stakes related to that localisation

- what the material consequences of their existence are (what they are made of, what happens when they are obsolete)

This materiality also encourages us to understand and demonstrate how this infrastructure is subjected to similar and ongoing geopolitical structures, power competitions and concentration dynamics outside the digital realm.

---

[55] Lionel Carter, Douglas Burnett, Stephen Drew, Lonnie Hagadorn, Graham Marle, Deborah Bartlett-McNeil, Nigel Irvine, International Cable Protection Committee (2009), Submarine Cables and the Oceans connecting the world'.

## Artist spotlight:
# Data and the natural world

As the earth revolves ever-faster around invisible infrastructure and light-speed communications, our screen-based relationships result in our connection to nature, and all that is human, beginning to fade. Julie Freeman's live online animated artwork draws on metadata from Zooniverse, a people-led research platform, to create an ever-growing dynamic environment.

Commissioned by the ODI and The Space.
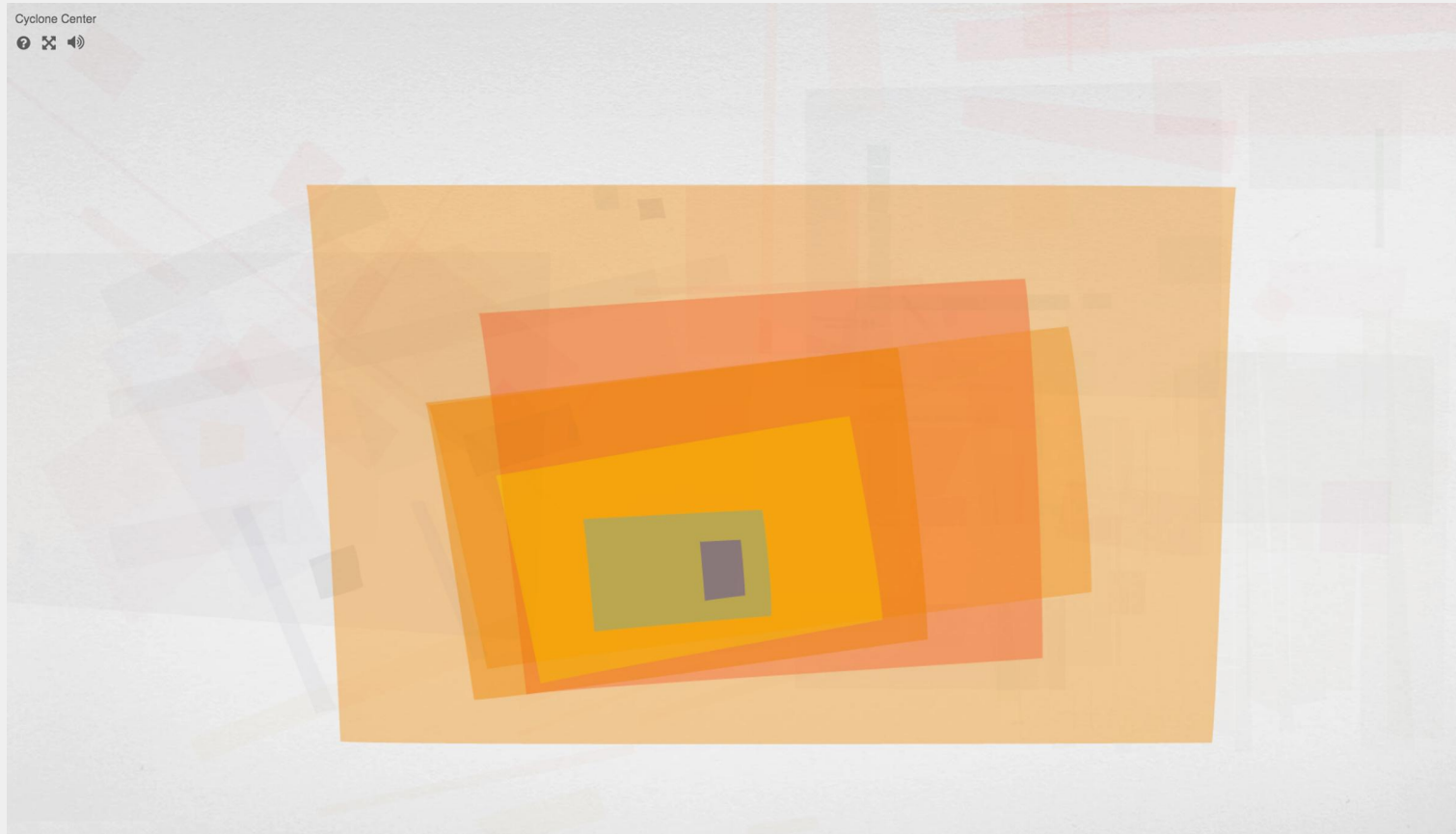


*Julie Freeman '[We Need Us](We Need Us)' (2014 -2017)*

# Every byte has a cost

To mirror the academic Castells,[56] there is a paradox at the centre of our modern, digitised lives; as we shift towards a wireless world, we are tied further to the physical infrastructure that underpins it. Internet infrastructure has material and environmental consequences. It is hard to comprehend the staggering use of energy that our internet infrastructure requires – at every stage of the creation, access, storage and sharing of data, intensive energy is required. For example, the Cloud now has a greater carbon footprint than the airline industry, and just a single data centre can consume the equivalent electricity of 50,000 homes'.[57] Data centres also require significant cooling, mainly through the use of water systems, which again have a considerable impact on local ecologies.

The location of data centres matters too as many data centres operate in water-starved regions in the West, 'in part due to the availability of solar and wind energy', hence real estate decisions can play 'a similar role as technology advances in reducing the environmental footprint of data centres'.[58] Indicative of this rising tension, in Ireland new data centre announcements were met with fury, with suggestions that the water and energy-intensive sites would contradict Ireland's climate commitments.[59]

Couple this with the astonishing computing power required for emerged and emerging technologies then the energy usage is hugely consequential:

- ChatGPT may have consumed as much electricity as 175,000 people in January 2023[60]

- Bitcoin, the world's largest cryptocurrency, currently consumes an estimated 150 terawatt-hours of electricity annually — more than the entire country of Argentina, population 45 million. Producing that energy emits some 65 megatons of carbon dioxide into the atmosphere annually — comparable to the emissions of Greece — making crypto a significant contributor to global air pollution and climate change[61]

- In April 2018, the music video for 'Despacito' hit 5 billion views on YouTube, using as much energy as 40,000 US homes in a year[62]

The 'new frontier' of development has led to an attempt to conquer the skies through satellite technology. Gärbedo, Marzecova and Vikström suggest that this renewed focus on satellites is 'paramount to the expansion of the technosphere'.[63] Over the past six decades, about 11,000 satellites have been launched, of which 7,000 remain in space – this will explode numerically if Starlink's approved plan for 30,000 concurrent satellites comes to fruition. Such expansion into space has ecological consequences. Highly-toxic fuel types propel satellites, and once retired, are allowed to 'reenter the atmosphere' – actions which may alter the

[56] From Stina Bengtsson (2012), 'Virtual Technologies of the Nation-State' in Ed. Göran Bolin, Routledge (2012), 'Cultural Technologies The Shaping of Culture in Media and Society'.

[57] Steven Gonzalez Monserrate, The MIT Press Reader (2021), 'The Staggering Ecological Impacts of Computation and the Cloud'.

[58] Md Abu Bakar Siddik, Arman Shehabi, Landon Marston, Environmental Research Letters (2021), 'The environmental footprint of data centers in the United States'.

[59] Pádraig Hoare, Irish Examiner (2022), 'Environmental campaigners blast 'head-scratching' approval for Ennis data centre'.

[60] Kasper Groes Albin Ludvigsen, Medium (2023), 'ChatGPT's Electricity Consumption'.

[61] Jeremy Hindsale, Columbia Climate School (2022), 'Cryptocurrency's Dirty Secret: Energy Consumption'.

[62] Naomi Xu Elegant, Fortune(2019), 'The Internet Cloud Has a Dirty Secret'.

[63] Johan Gärdebo, Agata Marzecova, Hanna Vikström, Anthropocene Curriculum (2014), Orbital geopolitics'.

chemistry of the atmosphere.[64] Starlink satellites also represent the single main sources of collision risk in low Earth orbit.[65] Broken satellites will further contribute to the growing problem of 'space junk' – more than 27,000 pieces of orbital debris are tracked by the US Department of Defense's global Space Surveillance Network (SSN). Debris or satellites in geostationary orbit at high altitudes can continue to circle Earth for hundreds or even thousands of years[66]; these satellites risk crashing into operational satellites – causing communication issues and further space junk.

The environmental costs of data storage and processing also depends on what the data is used for. The dual concepts of 'hot' and 'cold' data can express the different computational power and, therefore, the environmental cost. Hot data is data needed with instant access. Cold data, such as archives or data used for pattern recognition, tend to be stable datasets requiring less computational power. Cold data storage solutions can be turned off when not needed, saving significant energy usage.

There are shifts to make the data centre industry more environmentally friendly, for example, by using greener energy supplies like wind and solar or by recycling the energy. In the UK, an excited flurry of articles detailed how the excess energy from just one small data centre, provided by startup Deep Green, was heating a public swimming pool in Devon.[67] The Stockholm Data Park's aim is to heat 10% of Stockholm by 2035, and Microsoft is working with Fortum to attempt to reroute excess heat to the Helsinki Metropolitan area.

These critical data infrastructures are being absorbed into society as vital pieces of urban energy infrastructure and absorb communities into the global data economy.[68] Similarly, some people suppose that satellites could attempt to 'beam down' solar energy from space.[69] Attempts to make the internet cable ecosystem more sustainable are also coming to fruition through the use of SMART cables and greener energy.[70]

---

[64] Tereza Pultarova, Elizabeth Howell, Space.com (2022), 'Starlink satellites: Everything you need to know about the controversial internet megaconstellation'.

[65] Tereza Pultarova, Space.com (2021), 'SpaceX Starlink satellites responsible for over half of close encounters in orbit, scientist says'.

[66] Jonathan O'Callaghan, Natural History Museum, (n.d.), 'What is space junk and why is it a problem?'.

[67] Zoe Kleinman, BBC (2023), 'Tiny data centre used to heat public swimming pool'.

[68] Julia Velkova (2021), 'Thermopolitics of data: cloud infrastructures and energy futures'.

[69] Stuart Clark, The Guardian (2022), 'Beam me down: can solar power from space help solve our energy needs?'.

[70] SubOptic Foundation (2023), 'Sustainable Subsea Networks Map'.

## Artist spotlight:
## **Hybrid landscapes**

As digital infrastructure rides across our natural resources, Daniel Brown's highly photo-realistic digital animations, designed to create flowers that look real but that can't possibly be real, have increased resonance. The encoded words, data, digital detritus and glitches the artist has applied here reflect the context of the Digital Catapult, where the work was included in the 'Hybrid Landscapes' exhibition. They also speak to the interplay between digital and natural systems inherent to the Power and diplomacy in data ecosystems project.

An ODI/Digital Catapult commission.



*Daniel Brown 'Flowers 2017' (installation shot).*

# Communication in the sky, holes in the ground

Every piece of digital infrastructure can be traced back to natural origins. Key parts such as processors and batteries require minerals such as lithium, cobalt and more to make components. These are core ingredients of technology. Delving into the global supply chains of advanced technology exposes connections between data processing and systemic human rights, labour and environmental abuses.[71] Exposure to cobalt in countries such as the Democratic Republic of the Congo, Zambia and Cuba is being connected to lung disease, heart failure and possibly cancer – while the mining in these regions devastates landscapes, pollutes water, contaminates crops and turns soil infertile.[72]

A proposed lithium mine in Nevada, USA, was protested furiously by the Fort McDermitt Paiute and Shoshone Tribe, environmental groups and local ranchers as it was 'expected to use billions of gallons of precious groundwater, potentially contaminating some of it for 300 years, while leaving behind a giant mound of waste'.[73]

Satellites must withstand extreme temperatures and are therefore made from advanced material alloys, such as Kevlar and aluminium. One of the main minerals used to make aluminium – bauxite – is extracted via open mines, mainly in China, Australia and Guinea. These mines, such as the Alcoa-run mine in Australia, are alleged to be contaminating local water supplies[74] and failing to rehabilitate damaged forestry.[75]
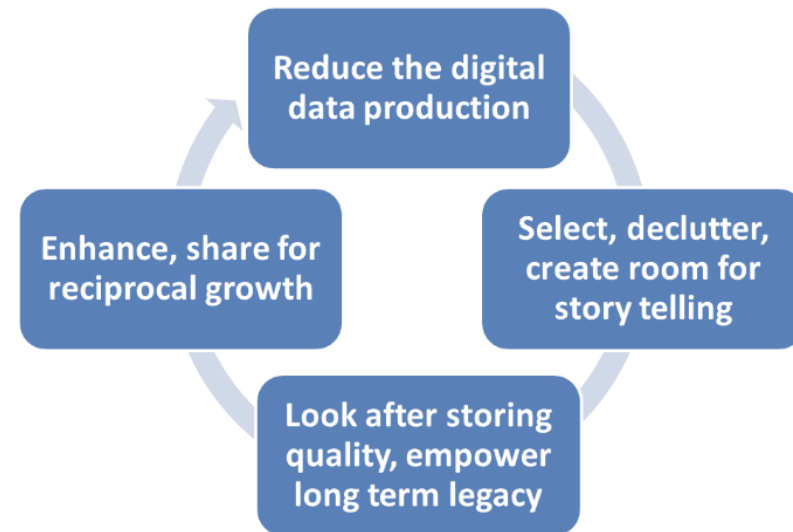


*Figure 3: 'The ecological use of digital data' (Source: e3s)*

---

[71] Todd C. Frankel, The Washington Post (2016), 'The Cobalt Pipeline'.

[72] Jonathan Watts, The Guardian (2019), 'How the race for cobalt risks turning it from miracle metal to deadly chemical'.

[73] Ivan Penn, Eric Lipton, The New York Times (2023), 'The Lithium Gold Rush: Inside the Race to Power Electric Vehicles'.

[74] Alicia Bridges, ABC News (2023), 'Alcoa says it can mine 'responsibly' after WA raises drinking water safety concerns'.

[75] Rebecca Le May, The West Australian (2023), 'Alcoa's failure to rehabilitate jarrah forest over 60 years of WA bauxite mining 'not appropriate': Minister'.

# The time for data minimisation?

The materials necessary for the current data economy, combined with extreme energy and water usage, make for a staggering ecological impact. The push is always for greener energy and more sustainable supply chains to allow the economy to continue at its current growth. But one question rarely arises (outside civil society, arts and academia) – should we attempt to process a lower volume of data? Though the focus is often shifted back onto the user – such as calls for users to delete emails[76] – organisations have been trying to move towards lower processing volumes. The Engine Room is pioneering a RAD approach (Retention, Archiving and Disposal of data).[77] A 'Databerg' report in 2015 found that only 14% of stored data was critical for business, with 32% being redundant and 54% being considered 'unknown data'.[78]

The report detailed the financial cost of this redundancy but did not detail the staggering environmental cost – of unused data. Here, organisations should be taking steps to minimise the creation and storage of data that does not have a clear purpose attached to it; such data minimisation attempts would reflect similar demands made from a privacy standpoint too.

As the volume of data created and processed continues to multiply, a reckoning with the ecological impact is long overdue.

---

[76] Sarah Griffiths, BBC (2020), 'Why your internet habits are not as clean as you think'.
[77] Barbara Paes, Paola Verhaert, The Engine Room (2021), 'Becoming RAD! New resource for organisations who want to develop plans for retention, archiving and disposal'.
[78] Veritas (2020), 'The Databerg Report'.

# Artist spotlight:

## 'Allusive Protocols' (2023)

### Artwork

We have commissioned a new artwork as a collaboration between the PDiDE project, the Data as Culture art programme and the [Invisible Dust Forecast 2023 Programme](#) (external partner). Building on her long-term research into nature, data and complex systems, Julie Freeman is creating a new kinetic data-driven work of art. 'Allusive Protocols' responds to the contradictions and relationships inherent to the PDiDE project. It considers how as much as the term power is associated with control, authority and influence, it is also about potential, energy, growth and passion. 'Allusive Protocols' considers how the power behind all modern infrastructure resides in functioning networked connections, the complexity continually growing beyond human comprehension. The project has been inspired by how this networked connectivity, consisting fundamentally of electricity transmitting signals through cables, radio waves, and microwaves, has a fragility that lends itself to both vulnerability and influence. Bonds of control, after all, are often seams of weakness.
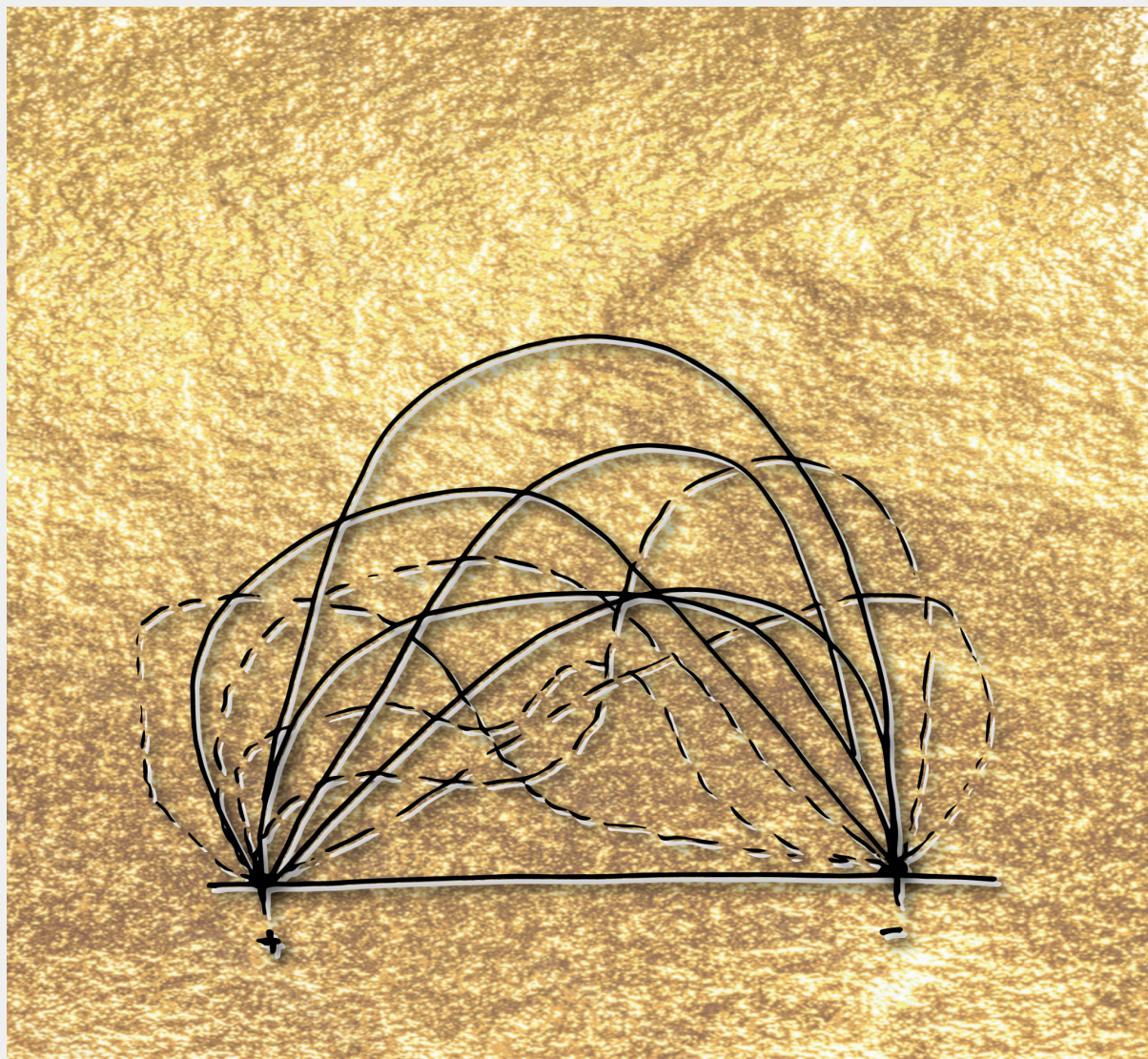


*Julie Freeman 'Allusive Protocols' concept sketch 2023.*

# Data as Culture: Artistic Intervention

### Method

We populated the [Power and diplomacy in data ecosystems project](#) (PDiDE) with artistic and curatorial forms of enquiry designed to expand its scope and expose the provocations to broader cultural perspectives and critical challenges. This was achieved through dialogue, asking questions and sharing research and contacts from art history and critical media theories. We drew on our public-facing exhibition messaging and making skills to curatorially build links and threads between ideas, contexts and people, which allowed us to identify broader opportunities to expand the research with partners and audiences. We expanded the project's reach by building a new publicly-facing artwork and associated programme, and conceiving of a new participatory process to interrogate the provocations in the project's next phase.

### Art concept

The three provocations of the project [Power and diplomacy in data ecosystems](#) are interrogating the political (theoretical/conceptual) and material impacts of data ecosystems that exist in the sky, on the land, and under the sea. They all consider how data is both ethereal and material – it is perceived to exist in two states.

- 'Allusive Protocols' comprises a series of drawing-like wire sculptures made from a shape-memory alloy (SMA) that exist in two forms. The objects contract, expand and reform as a data-driven electrical current is applied.

- 'Allusive Protocols' refers to the implicit powers that control our data ecosystems and the implicit powers that nature holds over the human race.

- 'Allusive Protocols' is a work that raises questions about the power dynamics, both obvious and not, that exist in current information communication. It is also a work that raises questions about the obvious and hidden power dynamics that exist in the natural world.

### Future steps

Working together on mission-critical shared research perspectives has been fruitful and informative. Beyond contributing to the overarching research and curating key contributors and ideas for the experts' roundtable, which took place in early 2023, we have been able to formulate new propositions for a co-commissioned artwork; an arts partnership for a high-profile public-facing event; a concept for an ambitious participatory and cross-sector new creative method/tool for policymakers within this field of research and a series of new conversations for joint research with academic and arts partners across the UK in 2023/24 and beyond, including with leading art schools the [Royal College of Art](#) and the [Centre for Research and Education in Arts and Media, University of Westminster.](#)

# 3 —
# Data as a tool for diplomacy

*Entanglements of state and private companies in complex systems of influence and rules*

As we have shown, control over data – namely, providing access to it and how it is shared – has become an increasingly powerful tool for state and non-state actors. The accumulation of power over critical data infrastructure and how it is guarded form part of the basis on which diplomacy – traditionally between states – takes place in the 21st century. In the context of data and digital technologies, we have witnessed the sizable influence that private actors have over these power relations due to the provision of critical data infrastructure they offer to states.

From an early stage in this research, we found many disparate interpretations of what 'data diplomacy' is and means. In the absence of an authoritative definition, and in the spirit of the ODI's holistic perspective on data infrastructure, we believe that data diplomacy may be conducted by all actors in the ecosystem, for example:

| Actors | Questions |
|---|---|
| **Local government** | • Should we allow a tech company to build a data centre in our area? |
| **National government** | • How do we balance promised investment and concession of power?<br><br>• To what extent will regulation impact innovation in emerging economic fields?<br><br>• How might we best position our country to limit the possibility of overreliance on particular actors? |
| **Supranational (including regional, eg EU, ASEAN, ECOWAS and global, eg UN, ITU, World Bank, IMF)** | • Can/ should we regulate private sector ownership of technology?<br><br>• Where does authority sit for regulation of specific emerging technologies and infrastructure?<br><br>• What are the barriers to harmonising national legislation at the supranational level?<br><br>• How might greater global cooperation be incentivised for the benefit of all rather than the narrow interests of individual states/ groups? |
| **Private sector (including technology companies)** | • How can we encourage states to invest in our technologies?<br><br>• How can we ensure regulation does not harm our mission/ objectives?<br><br>• How can we tackle societal challenges without putting our business model at risk?<br><br>• How might providing our product or service to one country impact our company's relationship with others? |
| **Third sector/civil society (including NGOs, charities, academia, journalists, citizen collectives, activists and artists)** | • How can we enshrine civil liberties protections in national law?<br><br>• How can we organise to lobby for using data held by tech companies to highlight some regulatory loopholes?<br><br>• How can we better encourage tech companies to share or open certain datasets to research institutions? |

# Diplomatic entanglements

Diplomacy is inherent in answering these questions and the negotiations needed to achieve the desired results. The traditional relationship between state bodies and tech companies over the last decades, in regulatory circles at least, has been largely adversarial – how can states regulate the activities of tech companies? Companies, such as Microsoft, are now said to be trying to 'shape cyber norms', flipping the narrative of the last decades.[79] There is, therefore, a blurring between the actors as permitted and non-permitted lobbying attempts to swing the agenda of regulators[80] such as the European Union (EU). Tech companies are also complicit with state activities – Google, Amazon, and Microsoft have all previously worked with, or are currently working with, the US Immigration and Customs Enforcement agency (ICE) and are therefore caught 'between its interests in serving foreign customers as a global business and the national security or espionage-related interests of domestic intelligence agencies'.[81] Diplomacy, on the part of tech companies, is used to negotiate the 'minefield' of government censorship. Illustratively, both YouTube and Twitter complied with the demands of the Indian government to take down a BBC documentary critical of Prime Minister Modi's role in the 2002 sectarian violence in Gujarat, which left over 1000 dead. Tech companies are drawn into these dilemmas, reckoning whether to comply with censorship and civil liberties violations in

exchange for continuing relationships within a country. The likes of Google, Meta, Microsoft, Twitter and Netflix now 'face a delicate dance between protecting their users and their business in what is probably their most important growth market'.[82]

Such diplomatic entanglement is also evident in the recent banning of TikTok on UK government devices[83], following a review which looked at the 'potential vulnerability of government data from social media apps on devices and risks around how sensitive information could be accessed and used by some platforms'.[84] While these fears may be legitimate, it is also apparent that these moves (which have also been taken in the US, Canada, New Zealand, the European Commission and France) are about much more than the security of data.[85] Instead, the issue cannot be separated from wider considerations of how much investment in digital infrastructure states are willing to let China make, as we can also see in the banning of Huawei. The politicking of TikTok, therefore, will focus on convincing states of its separation from China and that the processing of user data can take place outside of its reaches. These debates are not just between China and the West; Russia – which served as the location for the launch of One Web satellites on a pre-paid contract – demanded that the UK government sell its stake in the company and that One Web satellites would never be used for military purposes against Russia once the war on Ukraine began.[86] The delays caused a financial setback for One Web and frustrated its efforts to compete with Starlink, which seems to be more willing to bow to state pressure to protect its business interests.

---

[79] Robert Gorwa, Anton Peez (2018), 'Big Tech Hits the Diplomatic Circuit Norm Entrepreneurship, Policy Advocacy, and Microsoft's Cybersecurity Tech Accord' in B. van den Berg, D. Broeders (eds), Rowman & Littlefield (2018), 'Governing Cyberspace: Behavior, Power, and Diplomacy'.

[80] Clothilde Gouljard, Politico (2022), 'Big Tech accused of shady lobbying in EU Parliament'.

[81] Robert Gorwa, Anton Peez (2018). 'Big Tech Hits the Diplomatic Circuit Norm Entrepreneurship, Policy Advocacy, and Microsoft's Cybersecurity Tech Accord' in B. van den Berg, D. Broeders (eds), Rowman & Littlefield (2018), 'Governing Cyberspace: Behavior, Power, and Diplomacy'.

[82] Rishi Iyengar, Foreign Policy (2023), 'Modi Is Muzzling Big Tech'.

[83] Cabinet Office, Gov.uk (2023), 'TikTok banned on UK government devices as part of wider app review'.

[84] Ibid.

[85] Brian Fung, CNN (2023), 'TikTok collects a lot of data. But that's not the main reason officials say it's a security risk'.

[86] BBC (2022), 'OneWeb: UK rejects Russian demand to sell share in satellite firm'.

# Regulatory obstacles, hurdles and gaps

In earlier sections, we discussed how limited regulation has permitted actors to send thousands of satellites into space and allowed private ownership of vital undersea cables. New developments in the law in these areas are going to have to reckon with these issues. For example, the UN recently adopted a treaty on high seas[87] aiming to ensure the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction by establishing Marine Protected Areas (MPAs). The treaty will therefore force states or private organisations coveting the high seas for exploitation to have responsible and sustainable investments, respectful of marine ecosystems as 'what happens on the high seas will no longer be out of sight, out of mind' as stated by Jessica Battle from WWF.[88]

This critical step was seen as a 'victory for multilateralism and for global efforts to counter the destructive trends facing ocean health, now and for generations to come'.[89] One of the main challenges highlighted by analysts has been 'to equitably share the value of a global public good',[90] which, replicated to other sorts of public goods, like the internet, for instance, shows how possible it is for 'geopolitical tensions to be put aside in the interest of global cooperation'.[91]

This could pave the way for future multilateralism regulation around submarine cables, and why not other pieces of critical data infrastructure? Innovation and diplomatic efforts will also be required to overcome the growing space junk issue; for example, the United Nations already asks all companies to remove their satellites from orbit within 25 years of the end of their mission, but this timeline will likely need to be shortened as space becomes increasingly cluttered.[92]

Developments in data and digital are happening at an unprecedented rate, and new ways of collecting and using data are emerging far more quickly than policymakers can respond to them. Internationally, countries such as Thailand, have just brought in data protection acts to mirror the EU's GDPR. But then, in regions that try to regulate quickly, contentious issues of Artificial Intelligence (AI) and online harms are currently high on the agenda.[93] For example, the European Commission's AI Act will likely be passed in 2023. It will take several years to come into force, and then be implemented, across the EU's member states.

[87] United Nations (2023), 'Statement attributable to the Spokesperson for the Secretary-General - on Int'l Legally Binding Instrument under the UN Convention on the Law of the Sea'.

[88] Karen McVeigh, The Guardian (2023), 'High seas treaty: historic deal to protect international waters finally reached at UN'.

[89] António Guterres, United Nations Headquarters (2023), 'UN delegates reach historic agreement on marine biodiversity'.

[90] Laura Wellesley, Aoife O'Leary, Chatham House (2023), 'The high seas treaty shows a future yet for multilateralism'.

[91] Ibid.

[92] Jonathan O'Callaghan, Natural History Museum (n.d.), 'What is space junk and why is it a problem?'.

[93] Emma Thwaites, Matt Davies, David Dinnage, ODI (2022), 'Data Decade: Data and public policy'.

# Artist spotlight:
## Structures of power

Thomson & Craighead's automated mechanical reenactment of a covert audio recording touches on our human rights to freedom of information and privacy in our contemporary world. It addresses issues that comprise part of the critical framework surrounding the need for open data, open source culture and net neutrality.

Created during an artists' residency at the ODI and featured in 'The New Observatory' exhibition, 2017. A collaboration between ODI and FACT Liverpool.
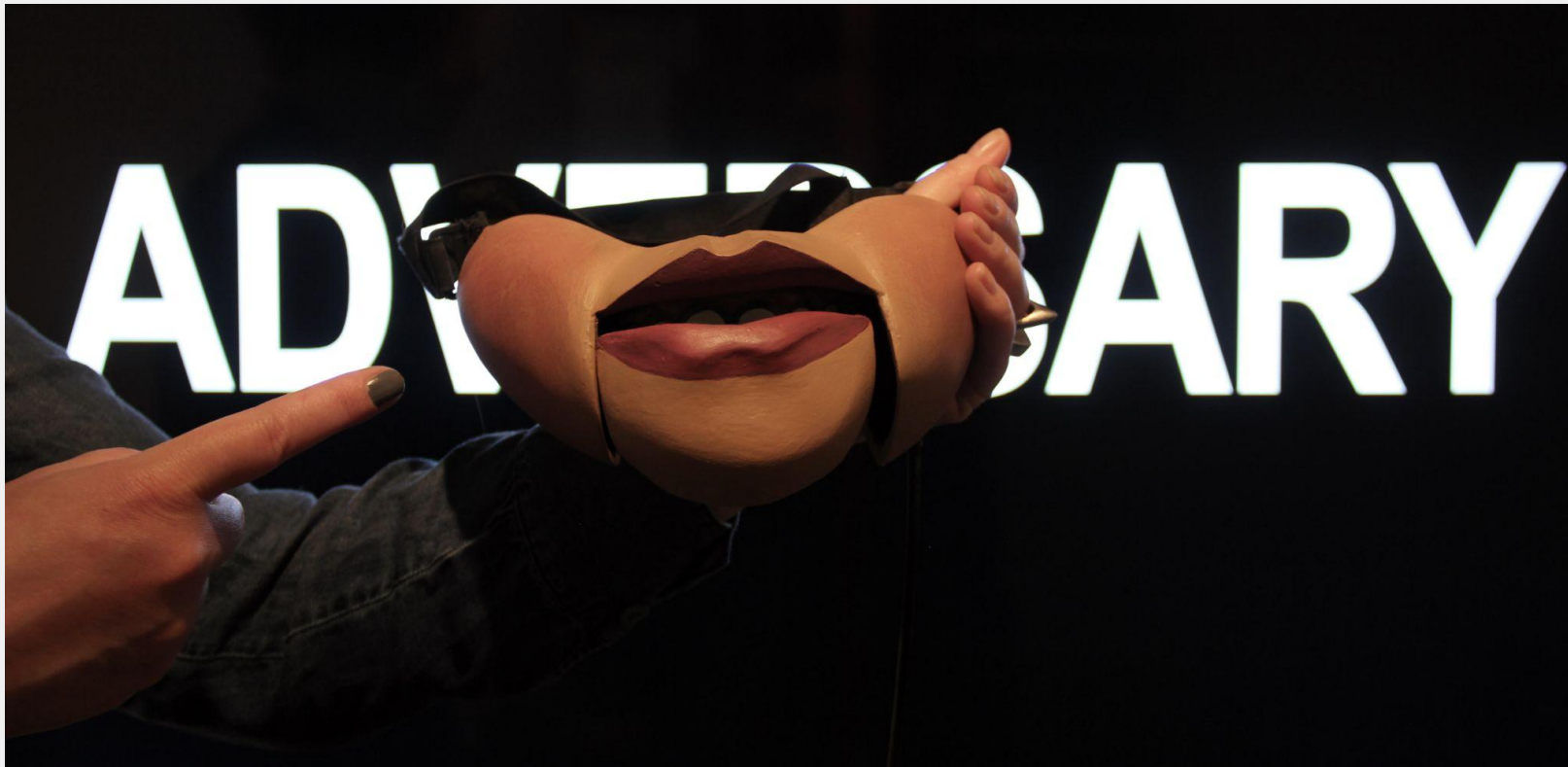


*Thomson & Craighead 'Recruitment Gone Wrong' (2017)*

Diplomacy is also waged by non-elected international bodies such as the World Bank, World Economic Forum (WEF), and the OECD. These organisations, in particular the OECD, attempt to drive global narratives – for example, attempts to tax the global digital economy – but often struggle to represent all countries at once. Instead, the OECD falls back to the majority economies:

> 'Furthermore, if a global agreement does not materialise and governments across the world develop their own systems unilaterally, we might start seeing providers pull their services from markets in which compliance costs are perceived to outweigh expected profits. We've seen this happen when the EU's General Data Protection Regulation (GDPR) took effect, and – at least temporarily – thousands of US newspapers decided to block EU visitors in order to avoid compliance risks'.[94]

More widely, there is the spreading phenomenon of the 'Brussels effect'[95] in that the EU has become the de-facto standard setter for data protection legislation and has therefore been one of, if not the most, significant actor in setting the rules. It appears it is looking to emulate this in the AI Act, too, which will likely add further data standards that will then likely be taken as the foundation for other countries and regions to build on.

# The future of multilateralism

We also need to consider who is left out of traditional diplomacy. Which organisations and states cannot wield power to regulate for their benefit? Which states are not operating in their people's interests? There have been calls for a reignition of the Non-Aligned Movement,[96] whereby states such as India, Kenya, and Colombia could collaborate against the major trading blocs, as they did during the Cold War. These countries – typically those considered as part of the loose categorisation of the Global South – already have the 'necessary leverage' as it is 'where most of the 50% of the world population that does not have access to the internet reside – people whose knowledge has not yet been parsed by the global information system'.[97] We need to ensure that non-Global North countries are heard on issues relating to international data ecosystems:

> 'The cultures of the North are so intertwined with the rationalities that bred capitalism itself, that they struggle to imagine any articulation of a technological future that is radically different from our technological present'.[98]

Relatedly, access to Chinese satellites and the data they collect and transmit is being used as a bargaining chip in the next phase of the Belt and Road Initiative,[99] presenting developing digital economies with further contentious choices to make about ceding soft power for access to potentially useful technology.

---

[94] Juan Ortiz Freuler, openDemocracy (2020), 'The case for a digital non-aligned movement'.

[95] Anu Bradford, Oxford University Press (2022), 'The Brussels Effect: How the European Union Rules the World'.

[96] Latha Reddy, Anoushka Soni, Cyberstability Paper Series (2021), 'Is There Space for a Digital Non-Aligned Movement?'.

[97] João Paulo de Vasconcelos Aguiar, Charlie Muller, Internet Society (2022), 'What Is the Digital Divide?'.

[98] Juan Ortiz Freuler , openDemocracy (2020), 'The case for a digital non-aligned movement'.

[99] Oxford Analytica, DailyBrief (2019), 'Chinese satellites will build Belt and Road in space'.

## Artist spotlight:
# Speculative logic

Jackie Karuti's mixed media video work presents humanity as part of an interrelated system within imaginary, technical and actual realities. She poses questions about extractive and colonial practices and asks: what if logical readings are less effective than those that allow for speculation? She asks: is the world we live in the one we would imagine? Featured in 'The New Observatory' exhibition, 2017. A collaboration between the ODI and FACT Liverpool.



*Jackie Karuti 'There Are Worlds Out There They Never Told You About' (2016).*

# Conclusion: Redistributing futures

*What many of these contentions can be reduced to is, 'who is designing our future'? As our UK-centred research demonstrates, certain institutions are trusted more than others. Futures are 'unpredictable, uncertain and often unknowable'[100] but this doesn't stop particular visions from becoming a reality.*

Those who hold power in the digital world and the physical assets supporting it currently hold the keys. There will be consequences to the vision they are presenting and shaping – on people, economies and the planet. But this vision isn't a certainty. There is a role to play for artists, civil society, businesses and governments to present alternative visions for the future, futures that redistribute power to those deprived of it and futures that reckon with the ecological impact of data and digital technologies.

In particular we would like a number of considerations to be included when making decisions relating to international data ecosystems:

- Who is involved and excluded from controlling and utilising critical data infrastructure?

- The ecological cost of critical data infrastructure: is the potential impact of storing or using this data proportional to the environmental cost of doing so?

- How can alternative narratives be elevated to design the future of critical data infrastructure?

At the ODI we will continue to reflect on global and local dynamics within data ecosystems and we encourage other relevant stakeholders to do the same. We are recognising the tensions within advocating for a world where data works for everyone and some of the findings in this report. We would like to collaborate with organisations who are similarly contemplating these topics, including those working in public sector and civil society, academic and industry researchers, artists and arts organisations, journalists and thought leaders.

---

[100] John Urry, Polity Press (2016), 'What is the future?'