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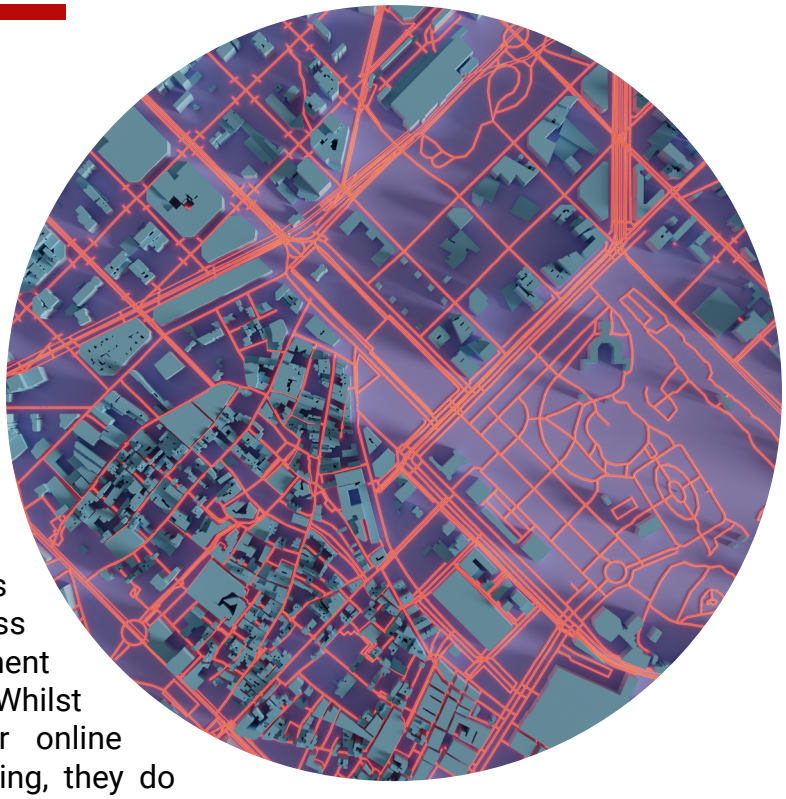
FEPS
FOUNDATION FOR EUROPEAN PROGRESSIVE STUDIES

TOWARDS A SUSTAINABLE AND RESILIENT FUTURE INTERNET

THE CASE FOR PUBLIC DIGITAL INFRASTRUCTURE



ABSTRACT

In 2020, the European Commission published its 'Shaping Europe's Digital Future' Communication. It announced a set of digital policies that would enhance Europe's technological sovereignty, whilst ensuring a sustainable and resilient internet. This policy brief analyses the EU's digital policy initiatives and argues that they risk remaining too fragmented to effectively reduce Europe's dependency on a few foreign firms and miss a powerful opportunity to spur the development of an ecosystem of value-led alternatives. Whilst recently proposed and enacted laws for online platforms and data governance are promising, they do not take a holistic view of the way the different levels of the technology stack interact, and most importantly fail to pay sufficient attention to developing open standards, protocols and digital public goods.

If the EU wants to break through the harmful dynamic of centralization of power that dominates the current digital economy, it should adopt a public digital infrastructure (PDI) model. This policy brief provides a blueprint of the institutions necessary to implement such a PDI framework. First, an independent public digital infrastructure agency would develop the open standards and protocols around data governance, collaborative interoperability, and more. Second, on top of that, a public technology fund would develop and maintain open tools, such as mobility apps, online education tools and an open European web index to enable growth. Finally, these institutions should support the development of a secure personal data wallet and self-governed online identity, which would allow individuals to share and pool their data, in full respect of their privacy and interests.

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STRATEGIC AUTONOMY SERIES
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Introduction

The European Union finds itself at a pivotal crossroads, with both external and internal pressures set to rewire the global order and economy – and with it Europe's place in both. There is a growing consensus across the continent that, if we want to preserve and promote the values we hold dear, from democracy to the protection of human rights, Europe needs to dramatically improve its capacity to act. Or, to cite Tomasi di Lampedusa's *Il Gattopardo*, "If we want things to stay as they are, things will have to change". To help give shape to this ambition, Europe's open strategic autonomy agenda offers a powerful framework through which we can set out a compelling vision for the future, and improve the resilience of not just our own societies and economies, but those around the world. This ambition to strengthen Europe's sovereignty and leadership position is particularly pertinent in the digital realm, which has become a key setting for resurgent Great Power competition. This paper sets out a proposal for what a values-led internet sovereignty agenda for Europe could look like.

As this paper will argue, strengthening Europe's role in the digital economy does not necessarily require closing ourselves off, nor should it mean a retreat behind borders. Here, instead, is an attempt to make the case for taking the exact opposite approach. At a time when global momentum appears to tend towards decoupling and the bifurcation of global governance processes, it is important that Europe sets out a vision for the future internet that is progressive, outward looking and open. In close collaboration with like-minded allies, Europe is well-placed to take a leading role in ensuring that the physical infrastructures that underpin the internet remain secure and sustainable, and proactively seek to remove dependencies and dangerous single points of failure across the technology stack. The governance of key issues, such as responsible deployment of new technologies in space or the weaponisation of artificial intelligence, similarly cannot be addressed by any single actor alone, but require a global response. Openness and collaboration should also guide our approach towards addressing challenges further up the internet stack. This paper primarily focuses on those top layers of the stack, by setting out a model for public digital infrastructure (PDI), which would seek to redistribute power over the internet by building a vibrant, diverse ecosystem of interoperable tools and solutions, on top of a shared set of rules, open protocols and standards.

Europe now has the momentum and opportunity to put such an ambitious sovereignty agenda into practice, but lacks the strategic focus to translate this opportunity into cohesive action. 20% of the unprecedented NextGenerationEU COVID-19 recovery funds have been earmarked to help facilitate the digital transition; the Digital Compass and accompanying digital principles help to set out tangible targets to which these funds should be allocated. On the regulatory side, the Digital Markets Act (DMA), Digital Services Act (DSA), Data Governance Act (DGA) and other key recently completed or ongoing legislative agendas are set to rewrite the rules for Europe's digital economy for decades to come. While these initiatives each individually hold much promise, they are, at present, too fragmented in their focus. The various components and agendas can be more effectively combined into a comprehensive, cross-stack strategy for the future. This paper sets out a progressive vision for a PDI model, which seeks to do just this.

This brief is made up of three chapters. To set out an achievable vision for the future, we need to understand the future in which we might be operating. The next chapter explores core dynamics across the technology stack that

are likely to drive the global internet's evolution moving forward. Chapter 3 will delve deeper into dynamics in the top layers of the technology stack: how can we harness interoperability, standard setting, and new data and identity mechanisms to build PDI? This brief concludes by setting out how the PDI model could help to bring us a more resilient and democratic future internet more generally, and simultaneously strengthen Europe's geopolitical heft in the technology realm.

1. Cross-stack approach: Interventions across all layers of the internet

When we think of the challenges we face on the internet today, there is much attention for those issues that emerge in the application layer and further up the technology stack – from the proliferation of disinformation to competition concerns. But, while many of these most-eye-catching issues do indeed manifest themselves most visibly in these slices of the system, their root causes often lie much further down the stack: in the fragile physical infrastructures that underpin the internet, in inaccessible governance processes or centralised data-hoarding practices. Challenges in one layer of the system have a tendency to reinforce harmful dynamics in others. Large platforms, in particular, have proven especially adept at further cementing their power by spreading their influence further down the stack, through, for example, dominating opaque but vital internet governance processes[1] or through acquiring their own proprietary infrastructures such as undersea cables and data centres.[2] This also increases the risk linked to fragile single points of failure.

A cohesive European vision for the future internet that seeks to address these dynamics needs to reckon with this cross-stack complexity. At present, many policy approaches focus on specific layers of the system rather than considering the internet in its totality. This is, for instance, the case for monopolisation and competition in the platform economy, which are mostly dealt with in the application layers, identifying the harms and using the regulatory tools most associated with that slice of the system. This not only reduces the effectiveness of any one intervention, but also leads us to – misguidedly – treat issues to do with, for example, the digital economy's business models separately from questions of security, even though both have shared roots and parallel players between them.

To help us visualise this complexity, in a previous report, the "power stack", which shows the various layers of the internet, not ordered, as usual, by their technical function, but rather by the ways in which power resides in them (see Figure 1), was introduced.[3] A cross-stack approach needs to combine a deep understanding of how these various layers interact – no easy feat – and employ a wide range of regulatory interventions, as well as bold institutional and technological innovation, to deal with the full complexity and intertwined nature of the challenges each brings to the fore.

Figure 1: The layers of the power stack model for the internet.

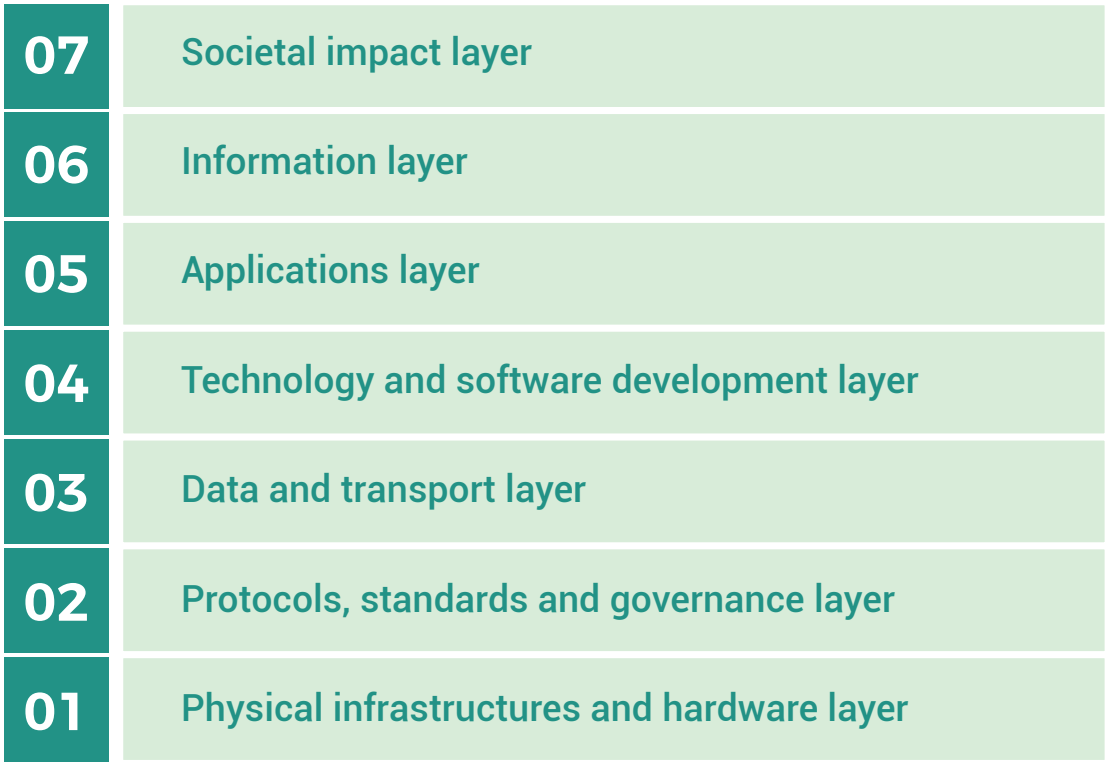


Figure 2: Examples of how challenges permeate through the power stack model.

	Democracy	Resilience	Sustainability	Trust	Inclusion
Physical infrastructures and hardware layer	Privatisation of infrastructure. Loss of the right to Tinker and restrictive ownership models. Market concentration in supply chains.	Vulnerability of infrastructures to cyberattacks and climate shocks. Arms race over resources. Weak governance of cyberspace.	Environmental footprint hardware. Lack of recyclability and right to repair. Path dependency and lock in.	Geopolitical tensions Supply chain dependencies. Eavesdropping and tapping of communications.	Lack of Affordable broadband access. Urban / rural digital divide. Socio-economic barriers to access.
Protocols, standards and governance layer	Internet governance dominated by a small number of actors. Increased complexity and opacity of governance processes.	Limited governance of (cyber)security issues. Take-up of critical patches and improvements.	Lack of focus on sustainability objectives in standard setting process.	Fragmentation and emerging splinternet. Breakdown of governance processes.	High barriers to entry for participating in governance processes. Lack of representation of diverse voices.
Data and transport layer	Concentration of power over data. Surveillance capitalism and surveillance states.	Data breaches and single points of failure. Weaponisation of large data lakes.	Environmental footprint of storing and processing data. Data minimisation.	Data collection processes are opaque, not consent-based and infringe on citizen's privacy.	Biases in algorithmic decision making. Right to Opt Out and Representation.
Technology and software development layer	Unequal access to talent. Power balances means tech for good does not come to fruition.	Democratisation leading to development of harmful solutions.	Proliferation of energy-intensive smart devices. Energy use of Blockchain and ML.	Lack of robustness in development processes. Government surveillance creep.	Lack of diversity in tech industry. Groups under-represented in tech development.
Applications layer	Walled garden siloing off the internet, and setting the rules. User lock-in and network effects.	Fragmentation in rule-setting approaches due to walled gardens. Fragility adtech business models.	Growth of more energy-intensive uses of the internet, such as video streaming.	Identity problem and lack of trust in online interactions. Lack of transparency about workings of apps.	Lack of accessibility and linguistic diversity in applications and services. Service shutdowns.
Information layer	Power of platform gatekeepers and other intermediaries. Online censorship.	Fragility of the online media ecosystem.	Information overload Inefficient design and SEO practices.	Disinformation and fake news. Emergence of deepfakes.	Online harassment and abuse. Multilingual internet and access to info.
Societal impact layer	Power of digital economy over physical businesses. Augmented neutrality.	Fragility of the barely-holding-on economy. Untethering from physical space.	Incentivising unsustainable consumerism. Not making use of full opportunities.	Meaningful consent and encroachment on public space. Smart city accountability.	Growing digital divide. Inequalities perpetuated by lack of access.

Of course, given the sheer size and rapidly evolving nature of the internet, it is not possible to fully address every challenge – especially not in a shorter paper such as this. This brief therefore focuses on three key, self-reinforcing dynamics that we see re-emerging time and again across layers of the power stack – **concentration, fragmentation** and **increased scale** – and considers how our approach of openness and diversification may help to address these across different components of the system.

Fragmentation: the global internet as a whole is on a path towards fragmentation.[4] The global pandemic and Russia's war against Ukraine have only accelerated a breakdown of governance systems that was already a long time in the making.[5] Within this era of resurgent Great Power competition and bifurcating global systems, technology has become one of the main stages for geopolitical tension. We see growing distrust about the provenance and trustworthiness of technologies, and a strong push towards national sovereignty, decoupling and reducing of dependencies. Fragmentation, especially in the lower levels of the system – such as technical standard-setting processes[6] – can bring us to a world of multiple, non-interoperable internets – indeed, a fully fledged splinternet appears to be closer today than ever before.[7]

Concentration: while we see more fragmentation between national regulatory regimes and corporate walled gardens, power within these siloes is increasingly concentrated. Across layers of the system, it is now often just a small handful of actors – private and public – who dominate. We are living in a winner-takes-all digital economy, where concentration begets concentration: those who currently dominate have access to data and are also best able to seize the next wave of innovation, to ensure they stay as powerful in the future. The current business models that fuel the internet make it hard to break through this dynamic and have enabled a situation where actors that are powerful in one slice of the system are able not only to wield power horizontally, but also to grow their influence vertically, across layers of the stack. An illustrative example here is the increased privatisation of data centres and undersea cables by technology giants like Netflix, Microsoft and Meta, which lead to difficult questions about net neutrality and competition, as well as about the security of such centralised infrastructures.

Scale: there are more of us than ever before connected to the internet,[8] on average, using more devices per person[9] and using those devices in ever more energy-intensive ways.[10] This increased connectivity across the stack is a great good, but also comes at a significant environmental and societal cost. The explosive growth in information and data not only put pressure on data centres and other key physical infrastructures, but our democracies and societies are also straining to maintain cohesion amid these uncontrollable information flows, which are, indeed, increasingly controlled by an exceedingly small number of actors. As we strive for more digitisation, how do we ensure this additional connectivity, and the increased encroachment of the internet into our physical and non-physical spaces, remains within planetary and cognitive bounds?

In the next chapter, we will explore how these dynamics manifest themselves across the layers of the stack, and a number of concrete interventions that might help us break through these self-perpetuating cycles are proposed. Chapter 3 will introduce a PDI model focused on the top layers of the power stack. Given the limited scope of this brief, we will limit our focus to just those layers where we see the problems

that have arisen from the concentration of power, scale and fragmentation most perniciously; the principles guiding this approach, however, apply to other layers of the system as well.

2. Towards PDI

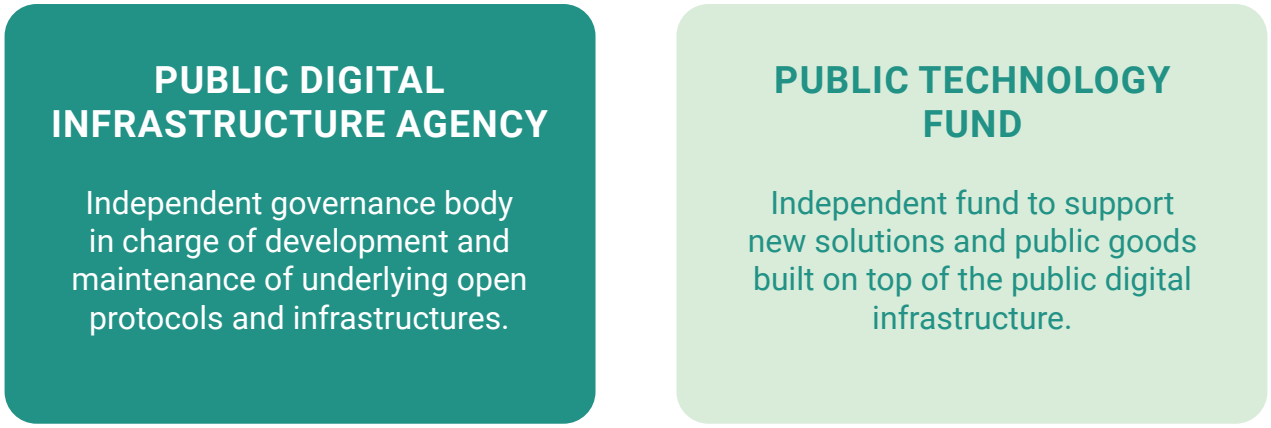
Many of the European Commission's most ambitious regulatory interventions, like the recently adopted DSA and the DMA, focus on addressing the worst excesses of the digital economy, as they manifest themselves in the application layer of the stack. At the same time, many of the EU's open strategic autonomy efforts, rather than try to address an extreme concentration of power, seek for Europe to become an innovation powerhouse in its own right[11] – often through the creation of its own technology giants. The contradiction between these two approaches risks muddling Europe's efforts in this space and makes it likely we will fall for the respective pitfalls inherent in each of these. Because, while the current wave of regulation helps to smooth the roughest edges of a fundamentally lopsided digital economy, it has little generative potential on its own. The ambition should not just be to reshape existing markets, but also to create new markets and ecosystems in which new alternatives can thrive, if we want to see real change happen. Conversely, the sovereignty camp's focus on creating European champions and illusive unicorns does little to address the root dynamics at the core of many of the challenges we face on the internet today. These proposed European giants would still be forced to play by the same set of rules that govern the current incarnation of the digital economy. A new solution does not automatically expound European values,[12] just because it was developed on the continent.

This paper, therefore, argues that we need to think differently about scale and centralisation: openness and distribution of power should be seen as a strength and source of resilience, not as a weakness. Nor should we be afraid of more proactively building alternative, European solutions to compete with the dominant actors in the digital space. To combine these two objectives, we propose a model for PDI, which would redistribute power over the internet by building a more vibrant, diverse ecosystem of smaller, interoperable solutions on top of a shared set of rules, open protocols and standards. This PDI model has three key ingredients, which are discussed in more detail in the following sections:

1. The creation of an interoperable ecosystem of alternative solutions through the establishment of a **public technology fund** and the strategic harnessing of **government purchasing and procurement power**.
2. The development of a shared set of open protocols, collaborative interoperability and shared rules through a new **PDI agency**.
3. The **opening up of access to data** through new data governance mechanisms and **online identities**.

It is important to note that the objective of the PDI model is not necessarily to replace or regulate out of existence the existing top-down models, such as the large platforms. Rather, this would be a new, parallel infrastructure that any solution, including those same platforms, would be able to opt into and develop on top of.

Figure 3: Two institutions for the PDI model.

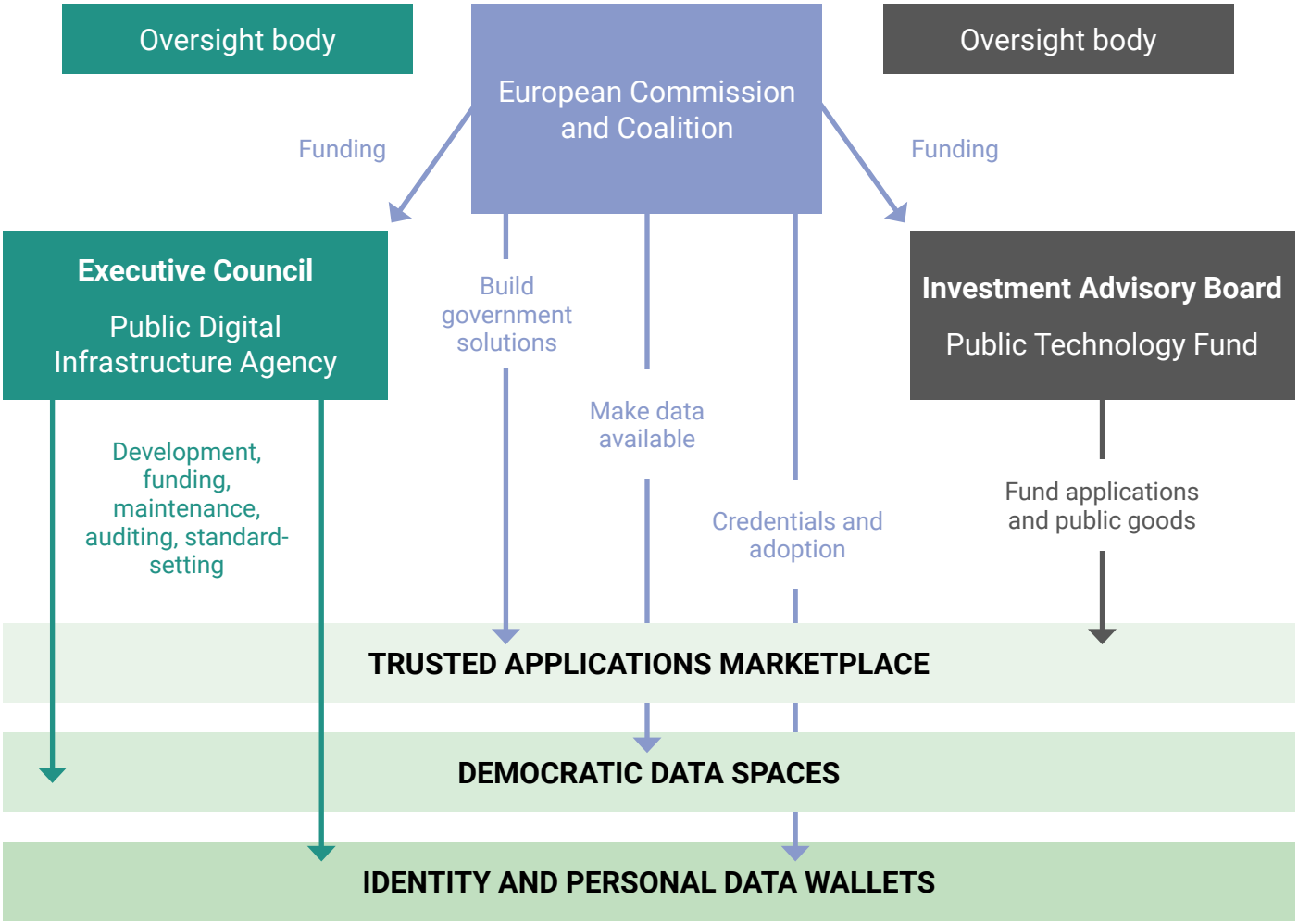


To ensure the early growth of the PDI model and to generate trust, governments – from the local to the supranational – would be encouraged, from the outset, to develop their own solutions according to the PDI framework. Also other trusted institutions, from public broadcasters to universities, would be encouraged to be part of this initiative from the start. Existing coalitions, such as the Shared Digital European Public Sphere,[13] PublicSpaces[14] and the BBC's public service internet proposals,[15] show there is already a significant appetite in these communities to be part of the kind of alternative models the PDI framework proposes.

We also already have most of the technical and regulatory building blocks at our disposal to make the PDI framework a reality. Ongoing legislative agendas, like the DMA,[16] with its ambitious provisions for interoperability, and the DGA,[17] which can be leveraged to create mechanisms to facilitate data trusts and data commons models, offer an important opportunity to put components of the PDI into practice. By creating a more diverse ecosystem of solutions, with a set of secure and open protocols underpinning it, we can also reduce the harmful single points of failure and dependencies that currently limit Europe's sovereignty and resilience in the digital sphere.

In the next three subsections, we will discuss the three ingredients for this approach in more detail.

Figure 4: The components of the PDI model.



2.1 An ecosystem of alternatives: Towards a public technology fund

This first sub-chapter discusses two proposals that could help to support the emergence of an alternative ecosystem of smaller, fairer solutions that could meaningfully compete with the large incumbents: the **establishment of a fully independent public technology fund** to support innovation and the development of **digital public goods**, and the **strategic use of government levers** to help alternatives gain traction.

New applications, especially those that seek to move away from the exploitative business models and data-hoarding practices that fuel the digital economy, currently face an uphill battle when it comes to finding sustainable pathways to growth. Network effects and economies of scale, as well as access to vastly more resources to improve user experience, integrate new features and influence policy processes, allow the existing players to continue to attract and retain the largest user bases. New entrants struggle to compete. This is a particularly pernicious issue when it comes to scaling up

open-source alternatives. While there are now, for example, very many free and open-source software (FOSS) video-conferencing solutions available, stability and scalability has meant that most of us spent the COVID-19 pandemic in front of Zoom and Microsoft Teams. We need to recognise that the market alone will likely not resolve this issue. Sustained public investment in the development and – arguably even more important – maintenance of new alternatives is vital. So is a commitment by governments and other institutions, from the local to the supranational, to switch their own software stacks to open alternatives, and leverage their own significant spending to grow the market for these tools.

2.1.1 A public technology fund

The European Commission should consider establishing an independently run public technology fund, which would be endowed to support the development of new applications and other solutions on top of the PDI model. By providing launch funding for the development of an initial set of key applications compatible with the model, this fund would help to ensure that a meaningful selection of solutions is available to users from the outset and encourage other developers to follow suit. We could think here of anything from alternative social networks to online education tools and mobility apps. A second remit would be to provide funding for the development and maintenance of digital public goods that do not otherwise have a clear path to sustainability in their own right, but would help to strengthen the ecosystem as a whole. Examples here could include the development of an open, European web index[18] – even alternative search engines, such as DuckDuckGo, currently rely on Google's web index – or online commenting systems that can be easily integrated into other applications.

The public technology fund would, in part, be modelled on existing funds, such as the Open Technology Fund[19] in the United States, established during Hillary Clinton's tenure as Secretary of State in 2012, which mainly supports the development of secure tools to help preserve freedom of speech and human rights around the world. Other interesting existing models are Germany's Prototype Fund[20] and new Sovereign Tech Fund,[21] which similarly support the development of open alternatives. The European Commission's own Next Generation Internet initiative[22] would provide a logical first home for this initiative. The public technology fund would have a slightly broader remit than the previous three examples and would seek to complement rather than to compete with these existing funding sources. That said, some redundancy can help increase resilience and is therefore useful. In general, collaboration with member states and like-minded allies in strengthening the various components of the PDI is key, and could be a potential avenue for future tech diplomacy and strengthening the transatlantic relationship, as the Biden administration seeks to strengthen its own response against increased market concentration in the digital economy.

The public technology fund would be funded by the European Commission, potentially in collaboration with like-minded allies, but its governance and day-to-day management would be run independently. Its decision-making structure would be made up of experts from the technology community, civil society and institutional funders. A potential way the PDI fund could have initially been funded is, for example, through the available NextGenerationEU funds earmarked for facilitating the twin transition.[23] Should the initial pilots of the fund be successful, the establishment of a dedicated, permanent funding stream at the European Commission level should be considered.

2.1.2 Promoting the adoption of alternatives through government spending power

Beyond the establishment of a dedicated fund, there is also much governments and public institutions can do to help new alternatives built on top of PDI gain traction. Governments around the world spend an estimated $13 trillion annually,[24] but often do not harness this enormous spending power strategically as a tool for standard setting and embedding values in the solutions they procure. The European Commission, member states and local governments can promote the adoption of the PDI by mandating the use of the underpinning standards and frameworks by solutions they fund, as part of grant and procurement conditions. They can furthermore commit to use these tools in their own technology stacks, making it easier for these smaller solutions to reach a critical mass of users. The European Commission can play an important intermediary role in promoting these kinds of market-creating levers.

2.2 Collaborative interoperability and open protocols

Underpinning the new ecosystem of solutions would be a shared set of rules, practices and open protocols, which would make it easier for tools and applications built on top of the PDI model to integrate with each other, and would allow all participants to benefit from shared resources, security and trust. We could think here, for example, of frameworks to enable data governance and sharing, data portability, online identity verification, online payments, security and interoperability more generally. These shared rules should not be imposed from above, but rather be collaboratively decided upon by members of the technical community, civil society, private sector and other interested stakeholder communities. A more broad-based, democratic decision-making process will not only help to increase trust in the resulting pillars and building blocks, but will also help to improve their quality and encourage their proliferation. To help facilitate decision-making and the "picking of winners" (the emergence of competing open standards is yet another manifestation of how fragmentation and reinvention of the wheel tend to plague the open-technology community), a new independent governance body, a PDI agency, should be established – funded by the European Commission.

The central logic behind such a new agency, and the standards it aims to develop, is that it can help to create the conditions for new, and existing, solutions to collaborate more easily, and to be able to proactively integrate their solutions with each other, rather than compete. We will call this principle "collaborative interoperability". Through this logic, we can move from a platform-based digital economy, where large incumbents are able to lock users into walled gardens made up of increasingly broader suites of solutions and applications, to a protocol-based economy, where a more diverse ecosystem of smaller tools can thrive together.

2.2.1 A PDI agency

When designing a PDI framework, striking the right balance between centralisation and decentralisation is important. Building on top of the shared set of rules should be permissionless and open to all – regardless of whether a solution is built in Europe or not, whether it seeks to make a profit or not – as long as they play by the rules. However, a more centralised mechanism is necessary in order to decide on the shared rules. This is why our framework proposes the establishment of a new, fully independent PDI agency, funded by the European Commission.

This new internet governance body would be tasked with bringing together the stakeholder community to collaboratively decide upon the governance and technical building blocks underpinning the PDI, to fund and oversee the technical development and maintenance of these building blocks – through in-house technical expertise or through supporting the FOSS development community, and through continuously auditing the security of the various components. To build trust in its outcomes and solutions, this agency needs to remain completely neutral (despite receiving funding from the European Commission and potential peer institutional funders), be transparently governed and participation open to all.

While anyone can participate in the open decision-making meetings of this agency, a permanent executive council – made up of members from the open-source and wider technology community; designers; legal experts; civil society and media, private and public sector, at a set ratio and voted in within their own pillars for single terms – would be put in place to oversee these processes. To ensure fair representation, members of this board would be selected through a regular election process, with representatives selected at a fixed ratio, according to the "stakeholder pillars" they belong to (e.g., the technology community, civil society, private sector, policymakers, general public). This ensures diversity of perspectives and prevents takeover by one of the pillars.

2.2.2 Collaborative interoperability

As a concept, interoperability – the principle that solutions should be able to work together or communicate with each other, regardless of who developed them – has been undergoing a renaissance of sorts in recent years. Indeed, interoperability can be a potentially very powerful tool for opening up the walled gardens that currently dominate our digital space. The final version of the European Commission's landmark DMA includes ambitious language on mandating interoperability.[25] The DMA, for example, introduces messaging interoperability,[26] which stipulates that it should be possible to send a message between messaging providers, for example, from WhatsApp to Signal. These proposals are promising, but not always easy to put into practice; complex back ends and an unwillingness among the large platforms to facilitate horizon interoperability, in particular, will make it difficult to develop entirely seamless user experiences.

But interoperability need not necessarily be a coercive instrument alone. New solutions can also voluntarily choose to integrate their solutions and, for example, facilitate data portability between their tools. By integrating the rules, standards and open protocols of the PDI into their own back ends, participating solutions are involved in what we will coin "collaborative interoperability". If practised at scale, this collaborative interoperability has significant generative potential and could even lead to the emergence of a full new suite of alternative, independent, but integrated, smaller solutions.

2.2.3 Provide support for maintenance of underlying protocols and systems to improve global resilience ["FOSSA plus"]

The PDI agency is, in its current design, primarily concerned with the development and maintenance of protocols and frameworks that directly pertain to the PDI model, but its remit could be expanded to play a wider stewardship role in preserving the stability of the global internet. It can do this by strengthening and maintaining the key open-source building blocks that form the internet's backbone. Many key protocols, standards and other vital bits of code and software are still run by just a

handful of volunteers or single organisations and companies. Not only is there a degree of fairness involved in compensating volunteers fairly for maintaining these critical components, it is also increasingly a matter of global security to remove single points of failure from the system. Indeed, we often only tend to notice infrastructure once it breaks.

The PDI agency, and the European Commission more generally, could play a valuable global stewardship role by providing funding for the support, maintenance and continued security auditing of these building blocks, as well as the running of regular bug bounty programmes [following the successful model of European Parliament supported EU-FOSSA (Free and Open-Source Software Auditing) programmes].[27]

2.3 Levelling the playing field through opening up data and online identity

The final ingredient of our PDI approach is the opening up of personal data and democratising online identity through leveraging data governance mechanisms and innovations in self-governed identity management. The privatisation of data and identity management is sometimes considered one of the internet's original sins, as it has enabled the extreme centralisation of power over these key functions. Indeed, for many solutions, competing in the digital economy today means generating unaccountable proprietary data lakes to help optimise their own services and sell advertising or our personal data itself. This exploitative race to the bottom harms the autonomy and privacy of users, locks in potentially valuable data into siloed data hoards, introduces high-risk single points of failure – look only at the rising costs of data breaches[28] – and generally leaves us with a less versatile and diverse internet.

We can break through this dynamic by addressing the governance gap around data and identity through devising a shared set of open protocols and standards, which would govern the sharing and management of data, data portability, and facilitate privacy-by-design identity verification across solutions. These models would be open and could be adopted by all. Beyond a shared set of rules, the PDI would further operationalise these principles through the development of a universal data wallet and self-governed online identity, available to all Europeans and beyond. The PDI model would allow the pooling of data on a fairer and more transparent basis, by leveraging innovations in data commons and data trust models. This would enable responsible solutions built on top of PDI to tap into this shared data resource in a reciprocal and fair way.

2.3.1 A universal data wallet and identity for all

In our PDI model, anyone – in Europe, and beyond – would be able to generate their own universal data wallet and online identity, which would enable us to decide which aspects of our data and identity we share with whom, and retract that access at any time. This would not only allow users to take back control over their own data, but would also allow new solutions that play by the rules to gain access to user data on a fair basis.

The underpinning technical building blocks and designs of these solutions would be funded, supported and maintained by the PDI agency introduced in Section 3.2.1. All components would be fully open and open to external scrutiny, ensuring the trustworthiness and resilience of the system. The European Commission would indirectly fund, but again not control, the development of this new model.

A number of ambitious current agendas provide the framework through which to put in practice this proposal: the Commission's updated eIDAS proposals and the Digital Compass have set out the ambition to issue at least 80% of Europeans with their own personal online identity and digital wallet by 2030.[29] The current proposal seeks to devolve the responsibility for the development of these identities to the member-state level, which will likely lead to fragmentation and further limit cross-border collaboration across the continent. This paper instead urges the Commission to focus on developing one, universal system based on the principles of self-sovereign identity and attribute-based credentialing, which could be leveraged not only to facilitate government-to-citizen interactions, but any such relationships between online actors, public or private.

2.3.2 From centralised data lakes to data commons

Once this identity and data wallet framework is in place, it becomes a lot easier for individuals to share and pool data, either at the service of the common good or directly with third parties. Solutions built on top of the PDI would, in this way, not just be able to benefit from trustworthy identity-verification mechanisms and data governance solutions, but potentially also tap into the data commons this would help to create. Where new entrants in the digital economy are currently often forced to accumulate their own centralised data lakes, the PDI logic would create "decentralised" data lakes, where participating solutions could be granted permission to tap into specific aspects of our data, as well as data generated by peer solutions on top of the PDI, and would contribute their own data in a reciprocal way.

We should not see this logic as the creation of one enormous pool of sensitive personal data, but rather as a series of data commons, data trusts and other similar mechanisms that would be governed on a case-by-case basis. To make this tangible, we could imagine the establishment of, for example, a health data commons, where patient groups could choose to share aspects of their health and mobility data, to enable trusted solutions to improve their services.

When the Commission originally announced the DGA, it conceded that Europe had already lost the battle for personal data, but still had an opportunity to shape the debate around industrial data.[30] While there is much value in opening up private sector data, it is not necessarily the case that the race for personal data has run its course: the rules can be rewritten, if we think of personal data beyond the usual accumulation logic that currently governs it. The current incarnation of the DGA focuses, in particular, on creating dedicated data spaces to open up industrial data in Europe and encourage private sector sharing; innovations in the data governance space could allow the extension of these data spaces to also allow the sharing of personal data. Beyond leveraging the provision for data spaces, as stipulated in the DGA, the European Commission, member states and other trusted institutions should generate trust and traction in the system by sharing their own data with the structures in a responsible way.

3. Conclusion & recommendations

A short brief such as this cannot cover the full breadth of challenges or opportunities an ambitious new model like the PDI framework presents. What this paper has, however, attempted to do is to make the case for a change in narrative, in which progressive ideals – of openness, diversity and preserving human rights – can go hand in hand with

Europe's ambitious aim of achieving strategic autonomy in the digital sphere. As we have seen, improving resilience does not necessarily have to mean "going at it alone", a retreat behind our own borders. Europe should collaborate with like-minded partners across the world to ensure the internet remains open, interoperable and resilient to external shocks. Strengthening Europe's digital economy similarly does not require taking the current rules of the digital economy as a given. The goal should not be to build the next Google or WeChat, but to build the infrastructures that can prevent the next Google or WeChat instead.

Being an advocate for openness and collaboration in an era of deglobalisation and mounting geopolitical tensions can appear naive – a strategy for preserving a unified internet and global standards should be realistic about where global cooperation might be possible, and where building "coalitions of the willing" might be the more effective course of action. The positive vision for an alternative, values-led model for the internet across layers of the stack – as presented by our PDI framework – can provide a tangible, alternative model that can be adopted, further shaped or emulated by countries now at risk of tipping into what we could consider more authoritarian frames of thinking about the internet.

Europe should harness its traditionally strong reputation and leadership role in the technical standard-setting realm, to promote the values and ideals behind the PDI model and ensure they can benefit all. Because, while the global internet has been subject to some degree of fragmentation from its infancy, technical and political fault lines and incompatibilities have become more pronounced in recent years. At the time of writing, the emergence of a bona fide splinternet, the balkanisation of the internet into a number of geographically bound, non-interoperable internets, appears closer than ever, as Russia seeks to make true on its long-term plans of constructing its own sovereign RUNet. Government-led internet censorship and outages have reached record heights, and the spectre of the bifurcated, parallel infrastructures along political lines (open versus closed) appears to be looming. "Swing countries" – home to many billion newly minted or future internet users – now often face a difficult decision in what kind of future model for the internet to adopt.

Beijing has been particularly effective at promoting its own models, through a combination of monopolising the standard-setting processes in the government-led bodies favoured by many developing countries[31] and exporting its technologies (especially to those governments who seek to replicate Beijing's surveillance-industrial complex). With time, this could lead to more countries finding themselves locked into beaconed-off, repressive innovation frameworks; competing technological standards can, over time, evolve into the introduction of non-interoperable, closed-off innovation spheres. It is high time that Europe became more proactive in championing its own values in governance processes, and in ensuring competing standards across institutions – in some ways, increasingly proxies for geographies and systems of government – do not take hold.

This paper has proposed several bold initiatives, in particular, focused at the top layers of the internet stack, that can contribute to this objective – and in the process, rethink the role governments and the European Commission, in particular, tend to play on the internet. This current moment of *zeitenwende* requires using the levers of governments strategically, at the service of creating a thriving ecosystem of alternatives for the services and centralised

infrastructures that currently dominate the digital economy.

An ecosystem of alternatives: Towards a public technology fund

- The European Commission, preferably in collaboration with like-minded member states and allies elsewhere, should make resources available for the establishment of an independently run **public technology fund** dedicated to funding the development and maintenance of open solutions and tools, as well as digital public goods on top of the standards and protocols that make up the PDI model.

- Members of the coalition, especially those institutions with existing networks and built-in user bases, such as large public institutions and public broadcasters, should commit to moving their own solutions onto the PDI model. Through familiarising a broad base of users with the benefits of this model, **trusted, large organisations can lead the way** in helping smaller initiatives flourish and reach critical mass.

- The European Commission and other institutional funders of technology, such as research bodies and charitable foundations, should become more proactive in stipulating the use of the standards and protocols underpinning the PDI model (such as standards for data portability, data sharing and interoperability) as part of their **procurement and grant conditions**. This will help these standards gain momentum, allow for more cohesion between newly developed tools and prevent costly lock-in.

- The European Commission should furthermore strengthen its own rules for **data portability** and **interoperability** in relevant legislation, for example, provisions for messaging interoperability, as included in the DMA.

Collaborative interoperability and open protocols

- The European Commission, in collaboration with like-minded peer nations and the wider technology community, should provide the funding and support for the establishment of a **PDI agency**, a new, fully independent, multi-stakeholder governance body focused on setting shared open standards around, for example, data governance, collaborative interoperability and identity management.

- The European Commission should play a global leadership role in ensuring **internet governance processes** – both those part of the new PDI and those covered by existing, aligned governance bodies – remain open, transparent and inclusive. This can be achieved through active participation in said bodies, careful institutional design that prevents the concentration of power and reduces existing barriers to access, and the making available of resources to those voices otherwise underrepresented.

- The European Commission should help to reduce the fragility of the internet's underpinning infrastructures by **promoting the adoption of FOSS and other open technology, and supporting their maintenance** – especially of key underlying protocols and frameworks, and provide funding to support auditing, issuing of trust marks and other security-enhancing mechanisms. A model to follow could, for example, be expansion of the EU-FOSSA project, a European Parliament sponsored initiative, which aimed to increase the security and integrity of critical open-source

software, through, for example, bug bounty programmes.

- **Harmonisation and simplification of procurement processes**, often a barrier to the adoption of open alternatives, should also be at the top of the Commission's agenda. The European Commission and other public and private funding bodies should promote the adoption of the open standards developed through the PDI agency by encouraging or mandating their use as part of procurement and grant conditions. The viability of formally mandating their use as part of upcoming legislative proposals should also be explored.

Levelling the playing field through opening up data and online identity

- The European Commission, ideally in collaboration with like-minded peer countries and funders, should make resources available to support the development of a set of protocols, as well the design of a **secure personal data wallet and self-governed online identity** available to all internet users.

- Members of the coalition, especially government and larger, data-rich institutions, should **commit to opening up, where responsible, their data through new commons and trust mechanisms**, and function as trusted intermediaries in providing identity credentials. Initial traction and support from trusted institutions is a key prerequisite for making the solutions built on top of the PDI scale successfully and provide value to users from the outset.

- The European Commission should harness the opportunity offered by the DGA to unleash valuable data from its siloes into **democratically governed data spaces** in a responsible manner. By extending the concept of data spaces to not just include industrial, but also personal data, the European Commission could help support the realisation of the proposed personal data stores element of the proposal set out in this paper.

- The European Commission should similarly consider taking a bolder approach in setting out its strategy for **a common European identity system**. The framework for a European digital identity should look beyond using online identity as a tool to facilitate interactions between government and citizens alone, but explore decentralised models that could help to construct a more universal identity model and counter the increased privatisation of online identity management.

Over the past decade, it has become all too clear that many of the fundamental pillars underpinning the digital economy are no longer fit for purpose; that the internet itself now just works for the few, not the many. The good news is that we have most of the technical and governance building blocks at our disposal, as well as the political momentum on our side, to radically rethink how we want the internet to work instead. Acting on the above recommendations, some of which might be ambitious – but all within the remit of the relevant bodies to explore – will allow us to make great strides in building a truly open alternative that gets to the root of some of the core challenges discussed in this paper, and helps to strengthen the "open" in open strategic autonomy. The internet is an important public good; it is time we treat it as such.

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About the author

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Katja Bego is an expert in digital policy and the geopolitics of emerging technology. She is soon starting a new role as Group Manager on emerging technology and foresight at the UK's data protection regulator. She was formerly a principal researcher and data scientist in Nesta's technology futures team, where she led the organisation's work on the future of the internet. She was also the principal investigator of the European Commission-funded NGI Forward project, which supported the Commission with setting the strategy and policy agenda of the Next Generation Internet initiative, the EU's ambitious flagship programme which seeks to build a more democratic, inclusive and resilient future internet by 2030.

She regularly comments on topics relating to the future internet and European strategic autonomy in outlets such as Wired, the BBC, Financial Times and The Guardian. Before joining Nesta, Katja worked as a data scientist in the private sector and as a researcher at the MIT Media Lab. She holds a degree in economics and political science from Wellesley College in the US, and is currently undertaking a Masters degree in the History of War in King's College London's War Studies department.

STRATEGIC AUTONOMY
pathways to progressive action

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