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Task Force 3: Science and Digitalization for a Better Future

Harnessing the Potential—and Mitigating the Risks—of Using Digital Innovation to Build a More Climate-Resilient, Prosperous, and Democratic World

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Abstract

Humanity faces complex challenges across social, economic, and ecological dimensions. The window of opportunity for mitigating or reversing the most harmful effects of megatrends such as climate change is quickly closing. The coming decade could be a critical turning point. It will also likely be characterized by unprecedented technological innovation that could provide the tools humanity needs to tackle some of its most pressing challenges. This policy brief examines the policies and investments G7 countries may adopt and promote to help humanity harness the potential for applying digital technologies responsibly to build a more climate-resilient, prosperous, and democratic world.

Challenges

Humanity faces complex challenges across social, economic, and ecological dimensions, and the window of opportunity for mitigating or reversing the most harmful effects is closing quickly. Major upheavals are expected in the coming years, including declining agricultural productivity (Asseng et al. 2015), exacerbated water scarcity (World Bank 2018), catastrophic loss of biodiversity (Hughes et al. 2018), climate-driven human migration (Kelleher, Kobayashi, and Niles 2019), an increase in extreme weather events (IPCC 2021), and economic shocks (Global Commission on Adaptation 2019) associated with one or more of these events. The coming years will also likely be characterized by unprecedented rates of innovation at the intersection of digital technology and the social and life sciences that—if harnessed and applied responsibly—may provide the tools humanity needs to adapt to or mitigate some of its most pressing problems.

Economies and societies worldwide are increasingly interconnected by digital technologies and services. This interconnection creates the opportunity to build a more nuanced, timely understanding of the world through digitally enabled science, and to act on scientific insights through digitally enabled services that can reach even the most vulnerable populations. In rapidly digitizing economies, data and digital technologies are becoming indispensable for managing and accelerating innovation, fostering economic inclusion, and strengthening individuals' democratic participation.

This global expansion of digital tools and services also brings new risks. Access to digital tools and services is expanding at different rates for different demographic groups: young people tend to lead in adoption; access and use for women and girls is expanding slowly and unequally compared with men and boys (in 2022, 69.2% of men and 63.4% of women were using the internet globally); and the expansion of digital infrastructure in developing economies (especially in rural areas) is generally much slower than in developed economies—even more so today, amidst a global economic downturn (81.9% of the population were using the internet in urban areas and 46.2% in rural areas in 2022; ITU 2022). In relative terms, Africa was the least connected region in 2022, with 60.3% of the population without internet access, followed by Asia (35.7%) and the Arab States (29.7%).

The overall penetration of internet services in a country tends to be correlated with its developmental status. Although the gap in internet access by women and girls might appear small on a global level (an estimated 5%), when looking only at least developed countries, that gap expands to 12% (ITU 2023). Furthermore, investment in new digital technologies tends to target consumers and firms in developed economies. As a result, rural or low-income populations are rarely engaged in the codesign of human-centered digital solutions that could best serve their needs. These trends increase the risk of reinforcing social exclusion and widening inequality. In order to reap the benefits of digital technologies, mitigating or closing the gaps in their access and use will be essential. This lack of access is commonly referred to as the digital divide.

Improving access, however, can only be one part of the solution. Digital tools and technologies have contributed to the erosion of trust in many important institutions in recent years. Governments, firms, nonprofits, and the media are less trusted today than they were 10 years ago (Edelman 2023). There has also been a rise in large-scale state surveillance and the deployment of computationally driven propaganda (Bradshaw and Howard 2019), and research has confirmed that human biases can be encoded in automated systems (Obermeyer et al. 2019). Another concern is the massive

commercialization of user data to shape consumer tastes and exploit their habits, sometimes called "surveillance capitalism" (Zuboff 2019). These trends increase the risk that technology will subject individuals living in disadvantaged communities to data extraction instead of support their agency in a digitizing world. This disenfranchisement has been criticized as a form of "digital colonialism" (De Masi 2023). Building trust—especially trust in data and information—will be critical for ensuring institutions remain relevant and capable of rising to the social, economic, and ecological challenges of the coming decade.

Policies that foster equal opportunity to access digital technologies, reduce social exclusion, and protect the individual without stifling investment will be crucial for building an enabling environment for digital innovation. In such an environment, social, economic, and ecological goals will be balanced.

Against this backdrop, this policy brief aims to provide some recommendations—by no means exhaustive—on how to responsibly harness the power of digital technologies to "strengthen the resilience of our societies, promote human rights online and offline, address disinformation, and achieve gender equality" and build on the conviction of the Group of 7 (G7) that "democratic values make us stronger in tackling global challenges" (European Council 2022).

Proposals

Pursue Global Standards while Considering Local Contexts for Guiding Data Privacy

In order for digital innovation to contribute to the development of solutions to pressing social, economic, and ecological problems, access to good quality data is critical for deriving insights and developing new products and services able to transform insights into action. Policies are needed to responsibly protect sensitive data, especially data on individuals. The G7 member nations have more robust data protection policies than the majority of other nations in the world (DLA Piper n.d.), and the European Union (EU)—an observer commonly considered as an eighth member due to its contributions to and tendency to abide by G7 decisions—has pioneered globally influential approaches to regulating data privacy and protection. As a result, data protection legislation outside of Europe and the G7 often reflects the reach and the influence of the European data protection regime (Makulilo 2013).

The global influence of European privacy regulations, the EU's market size, and its enforcement of the concept of "adequacy"—that is, whether a country offers an adequate level of data protection to permit the free flow of data between the EU and that third country without the need for additional safeguards—gives the bloc considerable power over third-party digital products and services providers and non-EU states. As a result, this has led to a notable Europeanization of many important aspects of global commerce (Bradford 2020).

At the same time, an overly Europeanized international data protection regimes risks being perceived as external imposition. For instance, the EU's General Data Protection Regulation inspired the 2019 Data Protection Act of Kenya, a de facto omnibus data protection law (Erforth and Martin-Shields 2022). It imposes data handling regulations on the government as well as on

national and international firms conducting business in Kenya. While advancing global standards, strong EU involvement may also call into question the very legitimacy of the Data Protection Commissioner's office, which is rooted in absolute independence (Erforth and Martin-Shields 2022).

For effective digital privacy standards to be developed and implemented successfully across national borders, multilateral processes and local context will be important for averting the impression of them being the product of coercion by powerful states or groups of states (Michael 2016). Effective digital privacy standards must emerge from national cultural and economic contexts, and a process to foster interoperability across regimes must be developed and strengthened. The latter can effectively be promoted by like-minded nations and groupings of states.

In September 2022, several member nations of the G20 joined the data protection and privacy authorities of the G7 member countries to outline the prospects for the free flow of data, arguing for trusted and voluntary sharing of data under the rubric "Data Free Flow with Trust (DFFT)." The roundtable built on the G7 Digital Ministers' May 2022 pledge to "maintain a free, global, open, interoperable, reliable and secure Internet that supports innovation and strengthens respect for democratic values and universal human rights" (BfDI 2022). The G7 leaders' communiqué of 28 June 2022 confirmed their commitment to strengthen their efforts "to facilitate DFFT across borders, continue to harness opportunities, and to address challenges raised, in particular in relation to security, privacy and data protection" (BfDI 2022).

The G7 must continue to elevate and accelerate the development of national data privacy protections with a wider group of partner countries, while continuing to build on the commonalities across national policies.

Expand the Concept of Data Protection to Consider a "Right to Reasonable Inferences"

The protections afforded to individuals under data privacy regulations may only be partially effective in protecting them amid a deluge of personal data generated by digital economies and societies. In recognition of this, the G7 countries will need to address some of the challenges raised by this explosion in the amount of available personal data and should raise awareness of the importance of implementing a "right to reasonable inferences" to orient how data is interpreted across its member states (Wachter and Mittelstadt 2018). This would involve encouraging relevant entities to explain how, why, and for what purpose citizens' data is collected and used to draw and use inferences about them.

Establishing a right to reasonable inferences is key for several reasons:

First, establishing a right to reasonable inferences is a necessary extension of the right to privacy. Individual data privacy is increasingly being compromised by inferences made using technology platforms, which leverage big data and artificial intelligence (AI) to this end. The social network company Meta, for example, has been able to infer (what should be) the protected attributes of its users, such as their sexual orientation and race (Angwin, Tobin, and Varner (2017). The search giant Google has been able to predict the likely death date of hospital patients (Griffin 2018) by leveraging user data and national health records (Munce 2017). In 2016, Cambridge Analytica

demonstrated the power of generating individual psychological profiles for more than 200 million Facebook users. This was used to "micro-target" users to influence elections (Isaak and Hanna 2018), and this launched a new era of computationally driven propaganda that has quickly spread worldwide (Bradshaw and Howard 2019). These inferences may be privacy-invasive because they either allow companies to make decisions or political actors to wield influence based on data that individuals have not freely given.

Such inferences can be wrong. A social media company may wrongly assume a person has certain interests or characteristics based on their browsing tendencies or human social networks. This is particularly concerning when companies draw "high-risk" inferences about individuals, which can play an important role in a company's decision-making processes that may affect an individual's well-being, such as restricting access to housing or finance based on erroneous conclusions from such dubious inferences.

Establishing guidelines explaining how, why, and for what purposes data are processed would help users of digital services to give informed consent about data collection. This would include allowing them to decide what types of inferences a third party should make. Such guidelines could help to strengthen existing international data protection laws without blocking statistical and demographic authorities from using digital data for the public good.

G7 nations and the EU lead the world in the development of data protection policies, but, to date, these offer few protections against the risks associated with dubious data analytics. One approach that these leaders should explore is creating regulatory mechanisms for inferences to be challenged by users, requiring companies to explain the grounds on which specific conclusions are made. This would reduce the power imbalance between companies and their users. Working through the process of how these challenges might be addressed will also require governments to discuss local data protection and intellectual property law among stakeholders. Action in this area would be an important step in establishing more democratic and open governance of digital technologies. In turn, this may prove a critical enabler for well-informed participation in the democratic process.

Advance FAIR Data and Open Digital Standards for Research

Scientific research is indispensable for building our understanding and developing the potentially world-changing innovations humanity needs to manage or mitigate some of its most pressing problems. Science-driven innovation across multiple industries and disciplines can accelerate progress toward global climate resilience and the sustainable development goals (SDGs; Vinuesa et al. 2020) while balancing social, economic, and ecological needs (Gomes et al. 2019). Data and digital technologies are important enablers of all kinds of research, but they are constrained by a lack of quality, accessible data. Additionally, the geographic breadth of where digital innovation research takes place must grow. Knowledge and capacity building in this sector is especially important in developing and emerging economic contexts, where the potential for collaborative uses of data could push knowledge co-creation forward in new ways.

The demand for data is not new. Open data policies began to gain popularity more than a decade ago in an effort to address this demand, leveraging the internet and digitized knowledge in an attempt to create a global "knowledge commons" (Hess and Ostrom 2011). The research

community refined this vision in the form of implementing standards to enable scientific data to be more useful for human and machine use, calling for data to be findable, accessible, interoperable, and reusable (FAIR). Adoption of the FAIR data principles is advancing inexorably in life sciences research (Wilkinson et al. 2016). Advancing development and adoption of FAIR standards in the social sciences, where possible, will also be important for linking scientific discovery across domains and geographies, helping democratize science and making it more useful for informing individual and collective actions to solve challenging problems in new ways.

The geographic diffusion and adoption of digital innovations tends to correlate with the global digital divide. Most published research in leading-edge digital technologies, such as AI, is the work of a handful of institutions in advanced industrial countries, including in G7 member nation institutions with existing, strong research capabilities. As a result—without a concerted effort to democratize scientific discovery and innovation—the control, development, diffusion, and adoption of digital innovation will likely favor industrialized economic contexts in the coming decade. Adopting FAIR data can help accelerate and democratize much-needed scientific discovery. Advancing interoperability—the "I" in FAIR—will ease data discovery and reuse across research domains and across national and organizational boundaries. This goal can be accomplished by creating policies and guidelines that promote FAIR and open data standards while governing the collection, storage, and sharing of research data among scientific actors.

The coronavirus disease (COVID-19) crisis has provided a powerful recent example of how data sharing can work for the global good and result in useful innovation. Governments, nonprofits, research organizations, and industry mobilized at an unprecedented rate to align research and development efforts for therapeutics, vaccines, and diagnostics. This was made possible by global multi-stakeholder data sharing and well-developed biomedical data standards—a process that could have taken years in an isolated laboratory.

Governments and international policy makers can support similar agility, collaboration, and adaptability by linking science more quickly to solutions and by supporting the implementation of FAIR data principles. G7 states can play an important leadership and advocacy role. Financial support for capacity building, both technological and human, is critical for supporting the interoperability of public databases and other systems for knowledge exchange. Providing funding to universities and research institutions to develop and maintain infrastructure for open science, as well as for training staff to support technical skills and policy knowledge, is key to ensuring that policies developed and investments made to meet global goals such as the SDGs are based in science and evidence.

Implementation

G7 states are uniquely positioned to support the implementation of these proposals through their ability to guide global policies and agendas for action. During the 2021 G7 Summit, for example, participants committed to protecting 30% of the world's land and water. This provided increased political impetus for the 2023 adoption of the UN High Seas Treaty, which included a provision for such protections in all international waters. A G7 focus on responsible data protection, consent and protection regarding inferences and their use, and open science will be imperative to effect global change and help make previous G7 summit goals become a reality.

Leverage Multilateral Processes for Advancing Responsible Data Policy and Practice beyond the G7 Members

In 2022, several member nations of the G20 joined G7 states in calling for the free flow of data, arguing for the trusted and voluntary sharing of data or DFFT. This commitment must be expanded to encompass the policies, practices, institutions, and investments needed to advance responsible use of data, and these topics must be taken up in larger multilateral groups such as the G20.

Successful alignment of sovereign states to common standards is contingent on several factors. First, it requires country buy-in through multilateral processes. A shared understanding of the issues at stake and their salience must emerge. Simply using an identical nomenclature is not a sufficient condition for creating common practice. In the specific case of data protection, a legal and institutional environment needs to exist or be created that can translate political commitments into applicable law along with the necessary enforcement mechanisms. In other words, the implementation phase requires a strong focus. Public opinion needs to support newly introduced regulations to align norms and practices. These processes must occur in parallel and at different levels.

Regulations alone cannot guarantee the transformation of data protection regimes in practice. As a result, the engagement groups informing G7 decisions and commitments cannot focus exclusively on regulatory power, as is often the case with research on the EU (Bach and Newmann 2007); they must also consider the processes for implementation. The academic literature provides ample evidence as to how the EU shapes emerging economies through a combination of its own market size and advanced regulatory institutions (Bendiek and Römer 2019), but the evidence is scant when it comes to understanding and managing these effects on states that lack the necessary institutional capacities to easily adapt foreign regulation. At the same time, stringent regulation that is not adapted to the local ecosystem can stifle innovation and have unanticipated and unintended effects.

The focus on implementation is justified and relates to the argument about the importance of local contexts having causal effects on regulatory outcomes. Focusing on implementation implies—in addition to strengthening institutional capacities and skills—promoting and safeguarding independent data protection commissions. Too often, the full independence of data protection commissions or comparable institutions is not guaranteed. Next to independence, enforcement is key. Enforcement measures need to have a deterrent effect (i.e., adequately priced fines) and must be upheld despite state or non-state interference (Greenleaf 2019).

Adopt and Promote FAIR Data Standards and Infrastructures for Open Science

The diffusion and adoption of FAIR and open standards for data and science is glacial–inexorable, yet slow. Equipping humanity with greater agility and adaptability, linking validated science quickly to solutions, will be fundamental for navigating the complex challenges of the coming decade. The G7 should advance these goals by adopting and promoting FAIR data standards and taking up this topic with larger multilateral groups such as the G20.

Elevate Active, Localized, Responsible Innovation to the Level of Policy and Investment

The G7 should consider elevating testing and learning related to emergent digital technologies to the level of policy and investment and should take this topic forward to wider multilateral forums such as the G20 to accelerate potentially world-changing digital innovations.

The concept of responsible innovation has long informed the governance of scientific discovery, albeit often through a retrospective approach in which the effects of research are examined and determined to be harmful (Stilgoe, Owen, and Macnaghten 2013). Recent approaches seek to introduce better foresight and active engagement in technology innovation development. Stilgoe, Owen, and Macnaghten (2013) recommend four key principles for informing the democratic governance of emerging science and innovation while addressing social and ethical concerns:

Anticipation: seeking to identify potential adverse effects before developing or deploying an innovation.

Reflexivity: examining and making transparent the guiding value systems, theories, and institutions guiding innovation.

Inclusion: engaging stakeholders in the innovation in guiding the development of innovations, a move beyond top-down policy making.

Responsiveness: the ability to change direction in response to stakeholder views or changing circumstances.

The approach is well-suited to guiding digital innovations and has recently been applied to guiding responsible development of AI, and further complemented with a recommendation to create "digital sandboxes" where "multiple stakeholders can be engaged in rapid and supervised prototyping and piloting of novel ... techniques and technologies … to accelerate safe and secure innovations" (Tzachor et al. 2022). This approach must be applied, at a minimum, to the following aspects of digital innovation.

Data interoperability: This will be fundamental for leveraging data and digital innovation, which will require working across research domains, communities, systems, and standards. Building data interoperability requires focused technical engagement, iteration, and community building. Different technical contexts will evolve in different ways and at different speeds. National level policy makers, with the support of international organizations responsible for standard setting, will need to anticipate the financial resources required to respond to technical changes in how data is managed. This means budgeting the resources necessary to invest in hardware and technical solutions, as well as investing in the training and hiring of the experts necessary to implement technical and legal solutions.

Data agency: This refers to how policy makers build and support the agency of data holders and subjects—and engage them in guiding digital technologies, their use, and their regulation. Inclusion is a key theme here, since the types of data holders and subjects range from being individual citizens to agencies and firms. At different levels, individuals and individuals within institutions

must make decisions about what data is shared and how it is used. Bottom-up solutions such as mainstreaming data and integrating digital literacy into educational systems, and funding ongoing professional education on data policy, are examples of how policy makers can address and support society-wide data agency.

Emergent technologies: Successive waves of digital technologies can be expected to emerge, each with potential benefits and risks in local contexts. The principle of responsiveness will be key to governing technological change democratically and with agility. New technologies can create positive changes in societies across the world, so governments should embrace the potential of emerging technologies. This means governments will need the technical expertise to deal with the policy implications of technological change, and they will need to create inclusive approaches to building public consensus about the collective values of both new technologies and any new regulations to govern them.

Build a Positive Digital Future

Policy makers understandably seek to anticipate and avert the potential risks of misuse of data (e.g., violating privacy, legal and reputational risks associated with data breaches). As a result, many may adopt a reactive and defensive strategic posture and lose sight of the potential positive effects of a data-rich future. G7 member states should play an active role in defining a positive digital future and build the multi-stakeholder and transdisciplinary engagement needed to create this positive digital future in an increasingly multilateral and multicultural world.

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