Rights by Design: Opportunities for Human-Rights-Centred Regulation of Emerging Technologies

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This article considers the seemingly ever-growing creation, use and mainstreaming of emerging technologies. The author argues that a principled approach to regulating emerging technologies, centred on the promotion and realization of human rights, has yet to be established in the development and application of technology. To address this, the author proposes adopting a "rights-by-design" approach to technology. The article explores the utility of core international human rights treaties, which set the standards for achieving human rights objectives through technology. While the international system of human rights has addressed technological innovation through initiatives, laws, directives and decisions, these frameworks have not been widely adopted by technologists who are continually developing new technologies. The author argues that similar to the "privacy-by-design" framework, a "rights-by-design" approach should be adopted. This would help integrate human rights discourse not only in the regulation of emerging technologies but also in their development.

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Since this article was written, technology has continued to proliferate in modern life and in particular Artificial Intelligence (AI) has exploded in use as applications that use AI driven by Large Language Models (LLMs) have been made available for the public. These technological developments, in my opinion, increase the need for the development of robust human rights by design framework which regulate all stages from creation to use of emerging technologies, including AI.

Cet article examine la création, l'utilisation et la généralisation apparemment en constante expansion des technologies émergentes. L'auteur soutient qu'une approche fondée sur des principes pour réglementer les technologies émergentes, centrée sur la promotion et la réalisation des droits de l'homme, n'a pas encore été établie dans le développement et l'application de la technologie. Pour y remédier, l'auteur propose d'adopter une approche de type « droits dès la conception » en matière de technologie. L'article explore l'utilité des principaux traités internationaux relatifs aux droits de l'homme, qui définissent les normes permettant d'atteindre les objectifs en matière de droits humains grâce à la technologie. Bien que le système international des droits de l'homme ait abordé l'innovation technologique par le biais d'initiatives, de lois, de directives et de décisions, ces cadres n'ont pas été largement adoptés par les technologues, qui développent continuellement de nouvelles technologies. L'auteur soutient que, de manière similaire au cadre « protection de la vie privée dès la conception » (privacy-by-design), une approche « droits dès la conception » devrait être adoptée. Cela permettrait d'intégrer le discours sur les droits humains non seulement dans la régulation des technologies émergentes, mais aussi dans leur développement.

I. Introduction

Our collective recent histories marked by the COVID-19 pandemic[1] have been dictated by the shocking experience of a worldwide public health crisis that led to an almost universal experience of isolation, uncertainty, and an urgent need to adopt different work, social and personal practices to navigate the drastically altered world. A central feature of pandemic life was the role of technology, that, for many, allowed life to continue.[2] Technology afforded opportunities for ongoing attendance at school, a continued working life, and the possibility of continuing social relationships, albeit remotely as school, work and social gatherings were all held online.[3] However, even as the power of technology was highlighted as a positive force and a unifying experience, the inequities and inequalities of our world were laid bare as the pandemic continued. The uneven and disproportionate impact of health care access, government support and even the types of work available to people were all exacerbated in different ways by technology.[4] Issues of access to technology, reliance on un-checked technologies and the limitations of technology were present throughout the pandemic.

Increasingly there is recognition of the need to think about human rights as they relate to digital technologies and activities. In June of 2021, nine United Nations Special Rapporteurs issued a joint statement in advance of "RightsCon", an annual conference where leaders in the field of technology

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1 The coronavirus disease, commonly known as COVID-19, pandemic was a global medical emergency. The pandemic began in 2020 and lasted until 2023. See, World Health Organization, "Coronavirus Disease (COVID-19) Pandemic" (last visited 25 March 2025), online (website): <who.int/europe/emergencies/situations/covid-19> [perma.cc/SCF2-SFWA].

2 See e.g. World Economic Forum, "10 technology trends to watch in the COVID-19 pandemic" (27 April 2020), online (website): <weforum.org/stories/2020/04/10-technology-trends-coronavirus-covid19-pandemic-robotics-telehealth/>.

3 *Ibid*.

4 On the increased negative health impacts of COVID-19 on racialized and Indigenous communities across Canada, see e.g. Public Health Agency of Canada, "CPHO Sunday Edition: The Impact of COVID-19 on Racialized Communities" (21 February 2021), online (webpage): <canada.ca/en/public-health/news/2021/02/cpho-sunday-edition-the-impact-of-covid-19-on-racialized-communities.html> [perma.cc/7C34-KK6M]. On discussing employment loss that was disproportionately experienced by lower-paid workers and young workers, and exacerbated already existing economic inequality experienced by minority populations, see e.g. Feng Hou, Kristyn Frank & Christoph Schimmele, "Economic impact of COVID-19 among visible minority groups" (6 July 2020) Statistics Canada, online (webpage): <150.statcan.gc.ca/n1/pub/45-28-0001/2020001/article/00042-eng.htm> [perma.cc/2XK5-9KG4].

meet.[5] The special rapporteurs' statement was on the collective need to centre human rights in the pandemic recovery. They wrote of concern about "patterns of abuse which have … accelerated under the exigencies of the pandemic" and identified a concern that these patterns will "continue and exacerbate inequalities worldwide."[6]

The collective group of special rapporteurs pointed to many concerns about the use of technology including internet shutdowns during peaceful protests, digital divides and accessibility barriers, including those affecting basic human rights and services.[7] They also raised issues related to disinformation and misinformation, attacks on independent and diverse media, algorithmic discrimination, online threats against human rights defenders, mass and targeted surveillance, cyberattacks and attempts to undermine encryption.[8] Furthermore, it was stressed that the pandemic had particularly heightened digital inequalities and discrimination against, among others:

> people of African descent, ethnic groups, minority groups and communities facing religious and ethnic discrimination, persons with disabilities, Indigenous peoples, internally displaced people, people affected by extreme poverty, women and girls, older persons, migrants, refugees, LGTQ+, gender diverse persons, human right and environmental defenders, journalist and activists, worldwide.[9]

In the opinion of the special rapporteurs, the solution to human rights concerns that are now exacerbated through the digital is to be found in both online and offline initiatives, both through government action and through the actions of private corporations. "We need" they write "to act together to embrace the fast-paced expansion of digital space and technological solutions that are safe, inclusive and rights-based."[10]

What is important about this statement is that it comes from nine international experts, none of whom are specialists in technology. Instead, they are experts from a variety of offices that fall under the umbrella of

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5 United Nations Human Rights Office of the High Commissioner, "Pandemic recovery: Digital rights key to inclusive and resilient world" (4 June 2021), online: <ohchr.org/en/press-releases/2021/06/pandemic-recovery-digital-rights-key-inclusive-and-resilient-world> [perma.cc/9QK4-ZE84] [UN Human Rights Office of the High Commissioner, "Pandemic Recovery"].

6 *Ibid*.

7 *Ibid*.

8 *Ibid*.

9 *Ibid*.

10 *Ibid*.

human rights and are tasked with carrying out independent fact-finding and monitoring roles on a variety of human rights concerns.[11] These Special Rapporteurs are independent experts from the following offices within the United Nations Human Rights system: the promotion and protection of human rights while countering terrorism,[12] the rights to freedom of peaceful assembly and of association,[13] on extreme poverty and human rights,[14] on Human Rights and Environment,[15] on the rights of persons with disabilities,[16] on the right to physical and mental health,[17] on the promotion and protection of the right to freedom of opinion and expression,[18] on the situation of human rights defenders[19] and the Working Group on Business and Human Rights.[20] Special Rapporteurs are independent experts

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[11] The institution of UN special rapporteurs holds an important place in international human rights mechanisms as they protect human rights by monitoring, fact-finding, and standard setting in the area of human rights. For information about special rapporteurs see generally, United Nations Human Rights Office of the High Commissioner, "Special Procedures of the Human Rights Council" (last visited 8 February 2025), online (webpage): <ohchr.org/en/special-procedures-human-rights-council>. There is no special rapporteur on the issue of human rights and technology, though there is one on the right to privacy but they were not a signatory to the press release discussed *above* note 5.

[12] Special Rapporteur on the promotion and protection of human rights while countering terrorism, online: <ohchr.org/en/special-procedures/sr-terrorism>.

[13] United Nations Human Rights Office of the High Commissioner, "Clément Nyaletsossi VOULE: Special Rapporteur on freedom of peaceful assembly and of association" (last visited 8 February 2025), online: <ohchr.org/en/special-procedures/sr-freedom-of-assembly-and-association/clement-nyaletsossi-voule> [perma.cc/3MCG-BKM3].

[14] United Nations Human Rights Office of the High Commissioner, "Special Rapporteur on extreme poverty and human rights" (last visited 8 February 2025), online: <https://www.ohchr.org/en/special-procedures/sr-poverty> [perma.cc/TGL5-YXA5].

[15] Special Rapporteur on human rights and the environment, online: <https://www.ohchr.org/en/special-procedures/sr-environment>. This special rapporteur thematic area has since been renamed to "Special Rapporteur on the human right to a clean, healthy and sustainable environment" (see, A/HRC/RES/55/2).

[16] United Nations Human Rights Office of the High Commissioner, "Mr. Gerard Quinn: Special Rapporteur on the rights of persons with disabilities" (last visited 8 February 2025), online: <https://www.ohchr.org/en/special-procedures/sr-disability/mr-gerard-quinn#:~:text=Gerard%20Quinn%20was%20appointed%20the,and%20Leeds%20University%20(UK)%3E.> [perma.cc/86LB-ZBYU].

[17] United Nations Human Rights Office of the High Commissioner, "Special Rapporteur on the right to health" (last visited 8 February 2025), online: <ohchr.org/en/special-procedures/sr-health> [perma.cc/RS3L-QFZK].

[18] United Nations Human Rights Office of the High Commissioner, "Special Rapporteur on freedom of opinion and expression" (last visited 8 February 2025), online: <https://www.ohchr.org/en/special-procedures/sr-freedom-of-opinion-and-expression#:~:text=Irene> [perma.cc/79UE-P722].

[19] United Nations Human Rights Office of the High Commissioner, "Special Rapporteur on human rights defenders" (last visited 8 February 2025), online: <https://www.ohchr.org/en/special-procedures/sr-human-rights-defenders#:~:text=Ms.,of Business and Human Rights> [perma.cc/2FJ5-5VZ9].

[20] Working Group on Business and Human Rights, online: <www.ohchr.org/en/special-procedures/wg-business>.

appointed by the Human Rights Council. Their mandates include monitoring, advising and publicly reporting on human rights violations on topics related to a given thematic mandate.[21]

The recognition of digital rights concerns from a variety of different perspectives signals how widespread digital and technological harms are. The joint press release written from a variety of different human rights concerns suggests that the Special Rapporteurs have individually, and now, collectively, seen in their work that the domain of the digital and the use of emerging technologies is not an issue for a select few technologists, but instead impacts us all.

As technological processes develop and become ever more ubiquitous, this article explores the possibilities for greater realization of rights through technological processes. This article considers the role of human rights in the development of appropriate regulation of emerging and established technologies, focusing particularly on artificial intelligence (AI). Human rights concerns are not unique to a particular type of technology or regulatory problem related to the use of any given emerging technology. Nor are human rights a subject matter area that can be considered apart from the development and use of technology. Instead, the author writes from the perspective that human rights issues are as ubiquitous as the proliferation of technologies and they must be present at all stages of technological development and use.

In order to address ubiquitous human rights concerns in technology, first principles must be relied upon to guide the *creation* of emerging technology, in addition to the *regulation* of these technologies. First principles are found in laws and regulations that exist and already provide the tools for thinking about regulation of technology. There are discrete areas that are traditionally relied upon to raise question about how we approach, understand and categorize technologies in law and policy. Areas traditionally looked at in relation to digital activities remain relevant; notably these are privacy, intellectual property (IP) and licensing concerns. In addition, however, the increasing proliferation of emerging technology and its current use raises legal concerns that are often not considered by technology experts. Issues of human rights, equality, access to services and promoting transparency in the

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[21] See United Nations Human Rights Office of the High Commissioner, "Special Procedures of the Human Rights Council" (last visited 8 February 2025), online: <ohchr.org/en/special-procedures-human-rights-council> [perma.cc/8GKF-XSHN] ["Special Procedures of the Human Rights Council"].

use of the same are areas of law and policy not traditionally engaged with by lawyers and advocates who work in technology law issues. Importantly, human rights remains an under-utilized area of law that contains the tools to not only respond to and ameliorate harms to individuals and vulnerable groups, but also guide the work of technologists as they develop technology. The assertion of human rights, as is articulated at national, regional and international levels, is an important tool for maintaining a focus on human-centric regulation strategies and with this to ensure technology in all its forms is developed as a public good.

II. Technology as a Governance, Policy and Technologist Problem

The advent of the internet brought much debate about how cyberspace should be governed. Responses ranged from the cyber-libertarian approach advocating for freedom and "anarchy" on the internet,[22] to recognition that the regulation of internet spaces occurs through a mixture of laws, norms, codes and internet architecture.[23] The legal community was further split on whether cyberspaces required the development of new laws to meet the needs of emerging internet spaces or whether existing structures of criminal, property, torts and administrative law would similarly apply to the cyber world.[24] The response settled into legal regulation through the most prevalent areas encountered in technology use. Issues which include concerns about free speech, defamation, ownership of internet spaces and evolving demands on concepts of privacy meant that select areas of law were particularly relied on to regulate the wide variety of emerging concerns. These include privacy law, intellectual property and contract law in the form of licensing.[25]

These areas of law continue to be the key areas used to regulate digital activities. Management and ownership of data rely on rules of IP. The advent

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[22] John Perry Barlow, "A Declaration of the Independence of Cyberspace" (8 February 1996), online: <eff.org/cyberspace-independence> [perma.cc/3NR2-CZJL].

[23] See Lawrence Lessig, *Code and Other Laws of Cyberspace, Version 2.0* (New York: Basic Books, 2006) online (pdf): <codev2.cc/download+remix/Lessig-Codev2.pdf> [perma.cc/ZT7L-9LWP] at part 1.

[24] Jürgen Feick & Raymund Werle, "Regulation of Cyberspace" in Robert Baldwin, Martin Cave & Martin Lodge, eds, *The Oxford Handbook of Regulation*, (Oxford: Oxford University Press, 2010) at 521–47.

[25] See Tenille E Brown, "A Human Rights Approach to the Smart City: Regulating Emerging Technologies in City Places" in Leonie Reins, ed, *Regulating New Technologies in Uncertain Times* (The Hague: Springer, 2019); see also Elizabeth F Judge & Tenille E Brown, "Open Data and Government Liability" in Teresa Scassa & Pamela Robinson, eds, *The Future of Open Data* (Ottawa: University of Ottawa Press, 2022).

of big data, open data, public sector information and public-private partnerships that generate mass amounts of data, to name a few, all entail elements of IP for management.[26] Licensing, which is another term for contracts, has been adopted to manage the complex network of IP rights that exist in software created to manage and utilize digital processes.[27] Open licensing schemes in the form of creative commons have been adopted as a counter measure to privatized systems.[28] Licensing schemes have also been adopted to indemnify providers of information, such as no-liability clauses contained in government open data licenses.[29]

Finally, protection of privacy interests is an ongoing consideration as technologies emerge to challenge individual privacy.[30] Principles of privacy have been utilized to ensure anonymization of data and raise concerns about the possibility of de-anonymizing data.[31] Privacy principles have enabled a response to the growing incidences of gender-based violence and harassment, particularly as seen with the rise of technology facilitated violence.[32] Privacy principles have challenged notions of public and private in internet space, particularly in the widespread use of mobile applications for personal activities.[33] Most recently, privacy is a prime concern in the emergence of dataveillance.[34]

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[26] Claudio Coletta et al, "Data-driven Cities? Digital Urbanism and its Proxies" (2017) 8:5 Tecnoscienza 18.

[27] Judge & Brown, *supra* note 25 at 142–143.

[28] An open license allows for free and open use of an author's copyrighted work but allows the author to retain copyright in their work. For more information see Creative Commons, "About CC Licenses" (2019), online (website): <https://creativecommons.org/share-your-work/cclicenses/> [perma.cc/B2D2-ZBVU].

[29] Judge & Brown, *supra* note 25 at 142.

[30] Rob Kitchin, "Getting smarter about smart cities: Improving data privacy and data security" (28 January 2016) at 82, online (pdf): <mural.maynoothuniversity.ie/7242/1/Smart> [perma.cc/A44P-SENR].

[31] Latanya Sweeney, "Only You, Your Doctor, and Many Others May Know" (28 September 2015), online: <techscience.org/a/2015092903> [perma.cc/J59H-CMNB].

[32] See generally, Canadian Women's Foundation, "The Facts about Gendered Digital Hate, Harassment, and Violence" (last visited 25 March 2025), online (website): <https://canadianwomen.org/the-facts/online-hate-and-cyberviolence/> [perma.cc/8CCB-FUMA].

[33] Jinyan Zang et al, "Who Knows What About Me? A Survey of Behind the Scenes Personal Data Sharing to Third Parties by Mobile Apps" (29 October 2015), online: <techscience.org/a/2015103001> [perma.cc/6MF9-TNUF].

[34] Shoshana Zuboff, "The Secrets of Surveillance Capitalism" (5 March 2016), online: <faz.net/aktuell/feuilleton/debatten/the-digital-debate/shoshana-zuboff-secrets-of-surveillance-capitalism-14103616.html> [perma.cc/5QM4-NBTS]; J Sadowski, "Access Denied: Snapshots of Exclusion and Enforcement in the Smart City" in Joe Shaw & Mark Graham, eds, *Our Digital Rights to*

At the international level, though these areas of law (IP, licensing and privacy) continue to be highlighted as central areas for consideration in a regulatory framework, increasingly the broader regulatory and governance framework is also considered.[35] On core areas of technology-law for example, the Office of the High Commissioner for Human Rights has urged that privacy rights be foregrounded in the use and development of technologies.[36] This work has been supported by the work and mandate of the Special Rapporteur on the Right to Privacy.[37] More recently, the need for a holistic, comprehensive response to the regulation of emerging technologies is beginning to emerge. For example in 2019, the Human Rights Council adopted resolution 41/11 "New and emerging digital technologies and human rights"[38] which recognized that there is a gap in knowledge about technologies that are rapidly taken up without an understanding of the impact on a variety of sectors and in different contexts.[39] The resolution requested the Office of the High Commissioner to organize multi-stakeholder discussions with UN bodies, member states, civil society, the technology community and others.[40] More recently, Resolution 47/23 adopted in 2021, likewise calls for a collaborative approach to address "[I]mpacts, opportunities and challenges" of emerging technologies,[41] and in 2019, the Office of the Secretary-General's Envoy on Technology was

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the City (United Kingdom: Meatspace Press, 2017) online: <https://ia902901.us.archive.org/28/items/OurDigitalRightsToTheCity/Our%20Digital%20Rights%20to%20the%20City.pdf> [perma.cc/J636-6WNT] at 6–11.

35 United Nations, "UN Secretary General's Strategy on New Technologies" (September 2018), online (pdf): <un.org/en/newtechnologies/images/pdf/SGs-Strategy-on-New-Technologies.pdf> [perma.cc/5AEL-QN6R].

36 See generally United Nations, "OCHCHR and privacy in the digital age" (last visited 20 February 2025), online: <ohchr.org/en/privacy-in-the-digital-age> [perma.cc/Y6T6-3TXR]; Human Rights Council resolution 75/176 of 16 December 2020 on the right to privacy in the digital age.

37 See generally United Nations, "Special Rapporteur on the Right to Privacy" online: <www.ohchr.org/en/special-procedures/sr-privacy> [perma.cc/A23Z-PEHH]. See generally on privacy in international law, Kinfe Yilma, *Privacy and the Role of International Law in the Digital Age* (Oxford: Oxford University Press, 2023); Carly Nyst & Tomaso Falchetta, "The Right to Privacy in the Digital Age" (2017) 9:1 Journal of Human Rights Practice 104 at 104–18.

38 Human Rights Council, "41/11 New and emerging digital technologies and human rights" (11 July 2019), online (pdf): <documents-dds-ny.un.org/doc/UNDOC/GEN/G19/218/53/PDF/G1921853.pdf?OpenElement> [perma.cc/U8Z7-6MYU] [Human Rights Council, "41/11 New and Emerging Digital Technologies and Human Rights"].

39 *Ibid*.

40 *Ibid*.

41 Human Rights Council, "47/23 New and emerging digital technologies and human rights" (13 July 2021), online (pdf): <digitallibrary.un.org/record/3936036/files/A_HRC_RES_47_23-EN.pdf> [perma.cc/3MNL-KBMV].

established.[42] Together these initiatives indicate that there is, first, recognition of the need for an institutionalized, governance led response to emerging technologies, and second, there are concerted efforts being made across different UN bodies and stakeholders to respond. The success of these many initiatives, insofar as they are able to present a unified and cohesive response, remains to be seen.[43]

A legal and policy approach that focuses on legal frameworks typically and obviously connected to digital activity is limiting. Firstly, these areas of law do not take into account just how startlingly different the new and emerging technologies are when compared to internet-based technologies. Where previously internet-based technologies enabled technologies that primarily occurred in the cyber world, now the technologies utilized have spilled beyond the edges of cyberspaces and into the built environment. The smart city, virtual and augmented reality, and even the proliferation of data-driven tech applications are all examples of internet-based technology that exists in and through the built environment. There is no longer a separation between digital and real-world activities and with this, there are "emergent forms of organizing, new modes of citizen engagement and novel ways of experiencing and navigating cities."[44] Navigation occurs both in utilizing emerging technologies and apart from these technologies.

Secondly, legal and policy responses have largely defined digital activities as informational in nature,[45] and certainly it is correct that data processes (as informational activities) are the core of all technological activities.[46] However, informational processes, as they are currently used, both capture information about places, people and activities that exist outside of the internet, whilst simultaneously manipulating informational representation of these places, people and activities. For example, as Google organizes and indexes information for retrieval,

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42 Mr. Amandeep Singh Gill was appointed as the Envoy on Technology on 10 June 2022. See United Nations, "About the Office of the Secretary General's Envoy on Technology" (last visited 10 February 2025), online: <un.org/digital-emerging-technologies/content/about> [perma.cc/H3ZF-28DV].

43 Kinfe Yilma, "Emerging Technologies and Human Rights at the United Nations" 42:1 IEEE Technology and Society Magazine (25 March 2023), online: <ssrn.com/abstract=3998498> [perma.cc/M7DJ-TZAL].

44 Laura Forlano, "Making Waves: Urban Technology and the Coproduction of Place" (3 December 2013) 18:11 First Monday, online: <firstmonday.org/ojs/index.php/fm/article/view/4968/3797> [perma.cc/Y2BW-LX4F].

45 Lessig, *supra* note 23 at 29–80.

46 Ibid.

> borders are displayed differently within the search engine depending upon which country the user views them from; businesses engage in 'radius bidding' to subtly alert users with the right profile to a different service provider; entire neighborhoods appear devoid of activity, and risk becoming the informational ghettos of the twenty-first century.[47]

This manipulation of information extends to entire regions as is seen in changing borders of Myanmar, Vietnam, Ukraine and others.[48] These observations adopt the perspective that the digital concerns must now be brought into discussions about city building and urban spaces by, for example, considering the ability for the digital to manipulate business practices. But it does not raise the correlative, which is that city issues, including human rights, ought to be brought into digital spaces. The legal and policy approaches have not responded to digital activities by taking a rights-first approach.

Third, there is a concern about emerging technologies which combine the collection of digital data with real world locations for purposes of automated decision-making processes, the consequences of which are not yet known.[49] Artificial intelligence is already all around us.[50] The growing use of automation within technological processes is not simply a development that impacts those interested in AI, but instead signals an entirely new facet to digital processes that are now ubiquitous in society regardless of one's personal use of those technologies. AI relies on and is precisely designed to interact with diverse technologies, whilst simultaneously having real world impact on the non-digital built environment. The impact of this is that the algorithmic decision-making impacts job opportunities, policing, sentencing structures, access to services, affordance of equal-opportunity in the use of technology, and the list goes on.

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47 Joe Shaw & Mark Graham, "An Informational Right to the City?" 4, in Joe Shaw & Mark Graham, eds, *Our Digital Rights to the City*, *supra* note 34 at 4.

48 Ibid.

49 On the growing awareness of the sensitivity of location data see: Rob Shavell, "The Skelton Key to Our Lives: The Risks and Consequences of Consumer Location Data Tracking" (3 February 2023), online: <forbes.com/councils/forbestechcouncil/2023/02/03/the-skeleton-key-to-our-lives-the-risks-and-consequences-of-consumer-location-data-tracking> [perma.cc/NW8L-GJ7S].

50 Since the writing of this article AI has increased its presence in modern life, particularly with the launch of "ChatGPT" in November of 2022, a tool that uses machine learning algorithms to process large amounts of data to respond to user queries. See, Bernard Mar, "A Short History of ChatGPT: How we got to where we are today" (19 May 2023), online: <https://www.forbes.com/sites/bernardmarr/2023/05/19/a-short-history-of-chatgpt-how-we-got-to-where-we-are-today/> [https://perma.cc/6FFE-345N].

As ever in this quickly moving digital world, the response to the real-world impact of these technologies from a law and policy regulatory framework has been slow, at times missing altogether.

III. Rights by Design

Norms that already exist within the technology sector can be utilized to create human rights norms.[51] The focus for technologists is on privacy, transparency and accountability. These terms have been utilized as benchmarks for the creation and adoption of technology that meets legal obligations – of privacy, and that also meet the policy objectives – of affording the adoption of technology for purposes of automation. The goals of privacy, transparency and accountability belie assumptions about the worth and utility of emerging technologies. Adopting human rights norms as the framework for regulating emerging technologies will take a marketable shift from assumptions about the utility of technology to the focus on measurable standards of human rights. A framework or tool that is useful for thinking about mainstreaming rights in a way that is useful for engaging with technologists is the concept of "privacy-by-design".

Privacy-by-design refers to the process whereby technology is developed from the perspective of ensuring that rights are an integral component of the design of the technology. The term "privacy-by-design" means data protection through technological design. Behind this is the thought that data protection in data processing procedures is best adhered to when it is already integrated in the technology when created. Ann Cavoukian, the former Information and Privacy Commissioner of Ontario, developed seven foundational principles that give meaning to the concept of privacy by design. These principles are:

- Proactive not Reactive; Preventative not Remedial
- Privacy as the Default Setting
- Privacy Embedded into Design

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[51] See generally, Marc J de Vries, Sven Ove Hansson & Anthonie WM Meijers, eds, *Norms in Technologies* (The Netherlands: Springer, 2013); Neil Postman, *Technopoly: The Surrender of Culture to Technology* (New York: Knopf, 1993).

- Full Functionality – Positive-Sum, not Zero-Sum
- End-to-End Security – Full Lifecycle Protection
- Visibility and Transparency – Keep it Open
- Respect for User Privacy – Keep it User-Centric[52]

These principles have been lauded as the cornerstone of regulation for ensuring that technology is developed in a way that meets the privacy obligations of developers of technology.[53] They are designed to be user-centric. That is to say that the focus is on the rights of the user and not (only) on functionality and efficiency of the technology. They introduce privacy-obligations into the design stage of technology whereby privacy is foregrounded in the creation of technology, rather than addressing privacy rights after technology has been created.[54] There have been varying perspectives on the success of privacy-by-design principles. However, they have been taken up by privacy advocates domestically and internationally,[55]

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[52] Ann Cavoukian, *Creation of a Global Privacy Standard* (November 2006), online: <ehcca.com/presentations/privacysymposium1/cavoukian_2b_h5.pdf> [perma.cc/GE6F-AM85]; Ann Cavoukian, "Privacy by Design in Law, Policy and Practice: a white paper for regulators, Decision-makers and Policy-makers" (2011), online (pdf): <gpsbydesigncentre.com/wp-content/uploads/2022/02/312239.pdf> [perma.cc/ELC8-63JF] [Cavoukian, "Privacy by Design"].

[53] On the adoption of privacy by design broadly see, Dag Wiese Schartum, "Making Privacy by Design Operative" (2016) 24:2 Int'l JL & Info Tech 151 at 154–155 (the author writes from the European perspective and discusses the Cavoukian principles from the perspective of ensuring operationalization of the principles by software developers) [Schartum]; Avner Levin, "Privacy by Design by Regulation: The Case Study of Ontario" (2018) 4 Can J Comp & Contemp L 115 at 120–123 (the author discusses the growth of privacy by design principles in the Australian, US and EU contexts, and successes and failures of privacy by design in Ontario, Canada) [Levin]; Alex Mihaildis & Liane Colonna, "A Methodological Approach to Privacy by Design within the Context of Lifelogging Technologies" (2020) 46:1 Rutgers Computer & Tech LJ 1 at 8–9, 19–20 (author acknowledges that privacy by design principles have been criticized as containing a lack of details for robust implementation, but nonetheless argues for use of the principles to manage privacy implications in "lifeblogging," wherein continuous streams of data are collected from persons and often for health purposes, because the principles demand robust privacy measures where other privacy measures fail).

[54] Deloitte, "Privacy by Design: Setting a new standard for privacy certification" (last visited 25 March 2025), online (pdf brochure): <https://www2.deloitte.com/ca/en/pages/risk/articles/Privacybydesign.html> [https://perma.cc/JR7B-HRDS].

[55] Levin, *supra* note 53; Nigel Davies & Marc Langheinrich, "Privacy by Design" (2013) 12:2 IEEE Pervasive Computing 2; Inga Kroener & David Wright, "A Strategy for Operationalizing Privacy by Design" (2014) 30:5 Information Society 355.

notably included in the European Union's General Data Protection Regulation.[56]

The central feature of privacy-by-design is the stage at which privacy considerations are brought to bear on technology. In privacy-by-design, privacy standards are embedded in the design of the technology as a proactive and intentional approach to privacy concerns.[57] This approach is in contrast to adopting privacy standards as part of a regulatory framework that looks at how the use of technology might impact privacy rights. Privacy-by-design places obligations on the developers of technology to ensure that privacy rights are not ignored as they create and develop new technology. Privacy is not an afterthought. Adopting a framework which puts privacy at the centre of technological innovation has proven to be a critical step in the current technological environment where there has been a striking increase in the use of algorithms, artificial intelligence and automation which all entail extensive data gathering and analysis.[58] A privacy-by-design framework serves as an important tool by ensuring that privacy interests are included in the design of technology.

Mirroring privacy-by-design, a rights-by-design approach prioritizes rights from the outset, serving not only to evaluate technological impact but also to inform its design and development. The goal is to embed human rights as the default setting in technologies, ensuring their use does not infringe upon these rights. Transparency in the creation and deployment of technology would be foregrounded. Visibility and transparency would ensure that persons have access to information about the operation of technologies, user engagement, and the measures taken by developers to protect rights though the design of emerging technologies. A rights-by-design approach places obligations on technology creators, architects, operators and businesses responsible for technological processes that increasingly affect all aspects of life, globally, and for all ages.

A human rights approach offers a cohesive framework for identifying human rights concerns, explaining their impacts, and utilizing applicable

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[56] EC, Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), [2016] OJ, L 119/1, art 25(1) [GDPR].

[57] Cavoukian, "Privacy by Design," *supra* note 52.

[58] Sofia C Olhede & Patrick J Wolfe, "The Growing Ubiquity of Algorithms in Society: Implications, impacts and innovations" (2018) 376 Philosophical Transactions of the Royal Society A 20170364.

legal frameworks to address potential harms in digital activities. International human rights offer a set of laws, regulations and customary law through which human rights can be addressed. Both soft and hard international law offer tools to frame concerns in a way that can be responsive to both technological harms and human rights concerns.

The language of human rights serves as a starting point for designing a rights-by-design approach to technology development, uniting complex issues of rights and technologies. The language of human rights signals that technology must be developed with reference to at least the minimum content of applicable human rights standards as is found in local, regional and international law. Speaking on the utility of human rights concepts as a way to consider anew obligations of actors at the city level, Oomen and Baumgartel highlight the unifying possibility of human rights:

> Reference to human rights can form a common language, thereby rallying different people, activities, and interests and strengthening social cohesion within the city; underlining a particular identity, but also strengthening its autonomy vis-à-vis the national government.[59]

Adopting this insight to think about the utility of human rights to technology development reveals the potentially unifying factor of human rights laws, norms and even language to digital activity. A human rights approach would ensure that people and human rights norms are central to technology initiatives. Adopting human rights laws as one of the key reference points in the development of emerging technology not only ensures that legal obligations are fulfilled, but in addition, it elevates the independence and self-determination of individuals, communities and peoples who use that technology. A human rights approach also highlights technology's potential to address today's most pressing human rights challenges, such as the potential of utilising data-metrics to address housing shortages, or, calculating and moving food bank supplies to people in need.

The adoption of human rights can be an iterative process, with human rights norms formed through ongoing, goal-based actions. The key challenge lies in defining a clear framework for applying human rights to the development, use and access of emerging technologies. This includes determining which rights are relevant in the digital context and how they can be effectively integrated into technological design.

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[59] Barbara Oomen & Moritz Baumgartel, "Human Rights Cities" in Anja Mihr & Mark Gibney, eds, *The Sage Handbook of Human Rights* (Los Angeles: Sage, 2014) at 726.

IV. International Human Rights as a Framework for Rights-by-Design

International human rights bodies and laws provide a cohesive body of human rights standards – something that is currently missing from the regulation of emerging technologies, which are largely shaped by technologists. Some human rights concerns arise specifically from the digital sphere, such as the issue of the digital divide, which was recognized early on as a significant challenge.[60]

The digital divide refers to the gap between those with access to digital tools – such as the internet, software and hardware – and those without.[61] This divide reveals itself along multiple lines: globally, with most technological advancements concentrated in select Western countries and tailored to their needs,[62] and socio-economically, with disparities between those who can afford and access digital resources and those who cannot. The digital divide challenges the assumption that technology provides equal opportunities for all people to engage with the internet.[63] This divide encompasses both a recognition the widespread lack of internet access in many regions and the inequality in opportunities to develop digital literacy. Recognizing this concern, the United Nations amended the Universal Declaration of Human Rights in 2016 to include internet access as a fundamental human right.[64]

In addition to human rights concerns that are specific to technology, broader non-digital concerns remain equally relevant in digital spaces. Issues such as freedom of speech, gender-based violence and internet regulation are deeply intertwined with rights-based concerns in the digital world. Beyond explicitly digital rights, many established human rights

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60 IEEE, "Impact of the Digital Divide: Economic, Social, and Educational Consequences," (last visited 25 March 2025), online: <https://ctu.ieee.org/blog/2023/02/27/impact-of-the-digital-divide-economic-social-and-educational-consequences/> [https://perma.cc/QYB4-5B2M].

61 Alan Wiig, Hail Pearsall & Michele Masucci, "The Smart City and COVID-19: New Digital Divides amid Hyperconnectivity" in Debra Mackinnon, Ryan Burns & Victoria Fast, eds, *Digital (in)justice in the Smart City* (Toronto: University of Toronto Press, 2023) at 288.

62 See for example, Matthew L Smith & Sujaya Neupane, "Artificial Intelligence and Human Development: Toward a research agenda" (April 2018), online: International Development Research Centre <https://idl-bnc-idrc.dspacedirect.org/handle/10625/56949> [perma.cc/NE9B-986X].

63 See for example, Mark Warschauer, "Reconceptualizing the Digital Divide" (1 July 2002) 7:1 First Monday, online: <firstmonday.org/ojs/index.php/fm/article/view/967/888> [perma.cc/S3Z6-KP4J].

64 General Assembly, Oral Revisions of 30 June, HRC, 2016, thirty-second session, A/HRC/32/L/20.

apply to digital processes and to people in urban environments. Principles such as gender equality, the right to housing, the right to life, liberty and security, democratic participation and the rights of the child all hold significance in the modern digital landscape. These rights, grounded in various international and regional human rights instruments, function as principles, norms and legal rules that extend to all individuals – whether they are using digital platforms, developing new technologies, implementing digital policies, or simply navigating life in an increasingly digital world.

A project from the University of California, Irvine, called "The Treaty Body Litigation Initiative" exemplifies efforts to address technology-related human rights harms by leveraging international human rights law. This project focuses on bringing complaints related to digital rights under existing international treaties. Spearheaded by David Kaye, a former UN Special Rapporteur on freedom of expression and opinion, the project aims to build a body of jurisprudence within UN treaty bodies on digital rights issues.[65] Though still in its infancy, the initiative seeks to unite lawyers and rights advocates from around the world to develop strategic cases that advance digital rights through the UN human rights treaty system.[66]

The Treaty Body Litigation Initiative plays a crucial role in ensuring human rights impacts of technological processes and emerging technologies are recognized and addressed. Regulating technology though human rights standards requires engaging with the rights and norms established in the nine core international human rights treaties. These treaties encompass civil, political, economic, social and cultural rights[67], as well as protections against racial[68] and gender discrimination[69], rights of the child[70], rights of persons

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[65] See for more information: Honoka Ozeki, Emily Livermore & Eva Shen, "Advancing Digital Rights through UN Treaty Body Litigation" (2022), online: <cpb-us-e2.wpmucdn.com/sites.uci.edu/dist/2/4290/files/2022/05/FINAL-Advancing-Digital-Rights-through-UN-Treaty-Body-Litigation.pdf> [perma.cc/QW9S-V8VH] [Ozki et al, "Advancing Digital Rights"].

[66] *Ibid* at 3.

[67] *The International Covenant on Civil and Political Rights*, (16 December 1966), General Assembly Resolution 2200A (XXI), and the *International Covenant on Economic, Social and Cultural Rights*, (16 December 1966), General Assembly resolution 2200A (XXI).

[68] The International Convention on the Elimination of All Forms of Racial Discrimination, (21 December 1965), UN General Assembly resolution 2106 (XX).

[69] The Convention on the Elimination of All Forms of Discrimination against Women, (18 December 1979), United Nations General Assembly.

[70] Convention on the Rights of the Child, (20 November 1989), General Assembly Resolution 44/25 [Convention on the Rights of the Child].

with disabilities[71] and safeguards against torture and other cruel, inhuman or degrading treatment[72].

Together, these international treaties provide a broad framework for addressing human rights concerns, with the UN human rights treaty body system serving as the mechanism for handling human rights violation complaints.[73] By drawing on these human rights frameworks, the Treaty Body Litigation Initiative expands the conversation beyond traditional technology-related legal issues such as privacy and intellectual property. Instead, it takes a more holistic approach, examining how technology affects individuals throughout their lives.

What this project does not do – and nor does it claim to – is take a pre-emptive approach to addressing human rights harms. That role would be fulfilled by a rights-by-design approach. In this section, the author explores key aspects of a rights-by-design framework, examining both the opportunities it presents for advancing human rights and the challenges it poses responding to the harms associated with emerging technologies.

A. A Human-Rights-by-Design Approach: Opportunities and Considerations

A rights-by-design approach guided by international human rights law would naturally draw upon international human rights treaties as legal foundations and rely on their monitoring bodies for implementation guidance. The nine core international instruments would serve as the primary sources for embedding human rights principles into technological design. These treaties address a broad spectrum of rights violations, including gender equality, children's rights, environmental rights and workplace rights. As a body of established law, international human rights standards provide core principles and goals that should be used to guide the development of legal and regulatory frameworks for the adoption of technologies.

Applying a rights-by-design approach drastically broadens the legal, normative and regulatory frameworks that could be brought to bear on the

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71 *Convention on the Rights of Persons with Disabilities*, (12 December 2006), Sixty-first session of the General Assembly by resolution A/RES/61/106.

72 The Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, (10 December 1984), General Assembly resolution 39/46.

73 "Special Procedures of the Human Rights Council," *supra* note 21.

creation of digital technologies. This approach requires assessing not only the rights traditionally considered in the regulation of technology but also the broader body of human rights law. Developers of technology would need to integrate these legal principles into their assessment of technological processes.

A rights-by-design framework would maintain a strong focus on core technological values such as privacy, access to technology, freedom of the internet and transparency in the use of algorithmic governance. These principles are important and remain central to the rights-by-design approach. Notably, many of these values are already part of human rights law, though balancing different rights can be complex. For example, privacy is a key concern, particularly in the context of children's rights. Article 8 of the *Convention on the Rights of the Child* affirms a child's right to preserve their identity.[74] At the same time, Article 12 protects freedom of expression,[75] including through digital media and emerging technologies. A rights-by-design approach would require technologists to navigate these intersecting rights, ensuring that children have opportunities to participate in technological processes where appropriate while safeguarding their identities through robust privacy measures.

An important challenge in addressing human rights harms caused by technology is determining who should be held accountable. The primary actors in the technological development are private entities, most often corporations. Incorporating companies into the human rights framework is an essential step in developing a human-rights-by-design framework that includes all relevant stakeholders. The UN Working Group on Business and Human Rights has been at the forefront of this effort, working to hold private businesses accountable for rights violations.[76]

However, accountability in technology requires deeper consideration of how technology operates, particularly due to the unknown aspect of how AI operates. AI's capacity to act in ways designers do not anticipate challenges the traditional assumption in tort law that courts only compensate for foreseeable injuries. Courts may arbitrarily assign liability to a human actor for reasons of fairness or efficiency, even when responsibility may lie elsewhere. Alternatively, courts may refuse to assign liability if the

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74 Convention on the Rights of the Child, supra note 70 at art 8.

75 Convention on the Rights of the Child, supra note 70 at art 13(1).

76 United Nations Human Rights, "Working Group on Business and Human Rights" (2024), online: <ohchr.org/en/special-procedures/wg-business> [perma.cc/7Q3C-WHCU].

defendant could not have foreseen the AI's harmful actions, potentially leaving blameless victims without recourse. As human involvement in AI-driven decisions decreases, product liability laws will likely play a greater role in holding companies accountable for their technologies.[77] Additionally, as AI systems begin to engage in behaviour that would be considered crimes if committed by a human, legal systems will need to navigate questions about who should bear responsibility and under what legal framework.

A key feature of privacy-by-design is the involvement of privacy rights experts at the technology design stage. Their role is to identify potential risks in how technology is developed and provide tools and recommendations to minimize or eliminate those risks.[78] For example, applying the principle of data minimization – limiting the amount of data collected through user interactions - reduces privacy risks by decreasing the availability of sensitive data.[79] Embedding rights principles early in the design and development process establishes necessary checks and balances before harms occur. To mainstream human rights into technological design, human rights experts must be involved from the outset application or algorithm development.

B. Challenges With Monitoring a Human-Rights-by-Design Approach

The call to frame technology regulation through a human rights lens is growing.[80] In part, this shift is the result of the increasing prevalence of

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77 Peter Stone et al, "Artificial Intelligence and Life in 2030. One Hundred Year Study on Artificial Intelligence: Report of the 2015-2016 Study Panel" (2016), online: <ai100.stanford.edu/2016-report> [perma.cc/4S47-ZUSD].

78 Cavoukian, "Privacy by Design," *supra* note 52 at 10; Schartum, *supra* note 53 at 160; Levin, *supra* note 53 at 118.

79 In Cavoukian's formulation of privacy by design, principle number 7 highlights "Respect for User Privacy - Keep it User-Centric", and data minimization is one part of creating a user-centric technology system that affords users opportunities to support their own privacy. See Cavoukian, "Privacy by Design," *supra* note 52 at 29; Schartum, *supra* note 53 at 156.

80 Work that has looked at the regulation of emerging technology utilizing human rights principles: Jonathon Penny et al, "Advancing Human Rights-by-Design in the Dual-Use Technology Industry" (2018) 71:2 Columbia J Intl Affairs 103; Nicolas Suzor et al, "Human Rights by Design: The Responsibilities of Social Media Platforms to Address Gender-Based Violence Online" (2018) 11:1 Policy & Internet 84; Commissioner for Human Rights of the Council of Europe, "Human Rights by Design: future-proofing human rights protection in the era of AI" (2023), online: <rm.coe.int/follow-up-recommendation-on-the-2019-report-human-rights-by-design-fut/1680ab2279> [perma.cc/A7XB-AYCN]; Alina Wernick & Anna Artyushina, "Future-proofing the city: A human rights-based approach to governing algorithmic, biometric and smart city technologies" (2023), online: <policyreview.info/pdf/policyreview-2023-1-1695.pdf> [perma.cc/A6C7-3YR3].

technology across all sectors and the need for substantive regulatory responses. In particular. the rise of artificial intelligence (AI), automation and algorithms has highlighted the urgency of developing tools to mitigate the harms of unchecked AI systems.[81] Access Now has advocated for a "human right impact assessment" for the use of AI.[82] "The goal", with instituting this assessment process, "is ultimately to identify technical adjustments that can be made to the AI system in order to eliminate the risks identified or to reduce them to an acceptable level."[83] However, as a relatively new concept, there is no consensus on the criteria for such assessments. In fact, the non-governmental organization AlgorithmWatch has identified 167 different ethical or human-rights-based AI principles, frameworks and guidelines developed worldwide in recent years.[84] While this reflects widespread recognition of the importance of human rights standards and ethical standards, the diversity of approaches creates inconsistencies in rights protections. What remains missing is a unified reference to the overarching framework of international human rights law, which provides universally recognized standards.

As practitioners and advocates work to protect digital and technological rights, they will encounter challenges and limitations in leveraging international human rights claims. Many of these challenges are not unique to digital rights but stem from broader issues regarding the applicability of international human rights law in domestic contexts.

Key hurdles include identifying applicable rights, standing and exhaustion. Standing is a principle that requires a state be a party to an international treaty and have agreed to accept individual complaints for a claim to proceed.[85] This poses a fundamental challenge in the case of the United States, which has not ratified several key human rights treaties, despite being home to many major digital actors. Additionally, the transnational nature of many digital companies places them beyond the reach of local litigators, both in terms of physical jurisdiction and financial

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81 See, e.g. Access Now, "Human Rights Impact Assessments for AI: Analysis and Recommendations" (2022), online: <accessnow.org/cms/assets/uploads/2022/11/Access-Now-Version-Human-Rights-Implications-of-Algorithmic-Impact-Assessments_-Priority-Recommendations-to-Guide-Effective-Development-and-Use.pdf> [perma.cc/7DZ5-AZF2].

82 Ibid.

83 *Ibid* at 8.

84 See Algorithm Watch, "AI Ethics Guidelines Global Inventory" (last visited 12 August 2024), online: <https://inventory.algorithmwatch.org/> [perma.cc/6W4Q-Q9YN].

85 Ozki et al, "Advancing Digital Rights," *supra* note 65 at 12.

systems, which could otherwise serve as leverage for addressing rights violations.

The location of the digital companies and the reach of their impacts present a significant challenge to the principle of domestic exhaustion. In international law, "exhaustion" requires the exhaustion of all domestic legal remedies available individuals before seeking international recourse for human rights violations. This principle is rooted in state sovereignty and the broader principle of non-interference in a nation's internal affairs.[86] Access to international enforcement mechanisms is considered a last resort, available only after the state has failed to address the violation or deliver justice.[87]

Another major hurdle is access to evidence. A central concern for technologists is balancing privacy protection with transparency and accountability in the face of intrusive data practices.[88] This concern centers around the opacity of digital processes used for monitoring and surveillance, the collection and storage of large swathes of data, and the algorithmic operations that occur in the "black box."[89] This lack of transparency can obstruct the ability to prove rights violations, ultimately limiting legal recourse at both domestic and international levels.

V. Conclusion

This article has examined the development of laws, rules and regulations for emerging technologies, arguing that while the future is undeniably digital, it must also be grounded in human rights. The author has not suggested the need for entirely new legal frameworks dedicated to digital technologies, nor the establishment of a new monitoring body focused on

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[86] The term "exhaustion of domestic remedies" refers to the general requirement that victims first use the judicial and administrative laws and procedures available domestically before bringing a complaint to international bodies. See on this International Justice Resource Center, "Exhaustion of Domestic Remedies," (last visited March 28 2025), online: <ijrcenter.org/exhaustion-of-domestic-remedies> [perma.cc/88ZD-PWY9].

[87] *Ibid*.

[88] In Cavoukian's formulation of privacy by design, principle number 4 requires "full Functionality – positive-sum, not zero-Sum" which is the goal of protecting privacy rights while simultaneously ensuring full technological functionality. These two aspects can be perceived as being in conflict, but the goal of privacy by design principles is to remove this false dichotomy and strive for both. See, Cavoukian, "Privacy by Design," *supra* note 52 at 10, 19.

[89] Frank Pasquale, The Black Box Society: The Secret Algorithms That Control Money and Information (Cambridge: Harvard University Press, 2015).

internet freedoms or digital rights. While such initiatives may become necessary as technological advancements continue at a fast pace, they are not prerequisites for adopting humans as the guiding principle in the development and use of emerging technologies. Existing human rights laws, standards and norms already provide a robust foundation for shaping technological progress.

Instead of creating new laws, The author proposes that a rights-by-design offers a framework for integrating human rights considerations into technological development. Similar to gender mainstreaming in human rights discourse, or privacy-by-design in technological contexts, human rights-by-design provides a structured way to identify human rights-based concerns from the outset. This approach should serve as the guiding lens for developing, implementing and overseeing technology.

Addressing the intersection of technology and human rights requires expertise from multiple disciplines, including technology and policy experts working on privacy, transparency and accountability issues. Additionally, human rights professionals must be actively involved in designing and implementing technological solutions from the ground up. The work of identifying digital harms and their disproportionate impact on vulnerable populations is already underway, as demonstrated by the 2021 joint statement from the nine United Nation Special Rapporteurs[90].

The pressing challenge for human rights defenders, practitioners, researchers and educators – both now and in the near future – is to ensure that human rights-by-design becomes a fundamental principle in the evolution of technology.

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[90] UN Human Rights Office of the High Commissioner, "Pandemic Recovery", *supra* note 6.