HUMAN RIGHTS IN A TECHNOLOGICAL AGE: THE RIGHT TO PARTICIPATE IN SCIENCE

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It has long been recognized that patent rights are in tension with human rights. The Universal Declaration of Human Right posits that scientific creators are entitled to the protection of the interests resulting from their scientific production. At the same time, it recognizes the right of everyone to share in scientific advancements and the benefits they create. Typically, this tension is framed as a clash between proprietary and access interests, with discrete conflicts resolved nationally by a combination of limitations and exceptions within patent law, and internationally, with flexibilities that give states room to further access interests.

There are, however, several drawbacks to this framing. It tends to limit access to things that others have created for their own purposes, it requires the Global South to rely on the Global North to fulfill its needs, and it creates a something-for-nothing narrative that makes international adjudicators wary of allowing states to enjoy significant flexibilities. This paper argues that the right to "share in scientific advancement" must be re-interpreted as a right to participate in the enterprise of scientific advancement. Recast in this way, the right would invigorate state efforts to enable locals to learn from and build on the work of others, fulfill unmet local demand, and ultimately, innovate at the knowledge frontier. At the international level, recognizing the right to do science as fundamental to human development would open policy space and allow states to do what is needed to become technologically self-reliant in areas crucial to their wellbeing.

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I. Introduction

The tension between intellectual property and human rights is well recognized and highly evident.[1] Consider, for example, the Universal Declaration of Human Rights (UDHR). It posits that creators have the right to protect the interests resulting from their scientific production, but at the same time, it recognizes the right of everyone to share in scientific advancement and its benefits.[2] Typically, this tension is framed as a clash between the proprietary interests of inventors and the public's interest in access.[3] Accordingly, it is typically re-

1. Examples include Ruth L. Okediji, *Does Intellectual Property Need Human Rights?*, 51 N.Y.U. J. Int'l L. & Pol. 1 (2018); Laurence R. Helfer & Graeme Austin, Human Rights and Intellectual Property: Mapping the Global Interface (2011); Intellectual Property and Human Rights: A Paradox (Willem Grosheide ed., Edward Elgar Publishing 2010) [hereinafter A Paradox].

2. G.A. Res. 217 (III) A, Universal Declaration of Human Rights (Dec. 10, 1948) [hereinafter UDHR]; International Covenant on Economic, Social and Cultural Rights, art. 15, Dec. 16, 1966, 933 U.N.T.S. 3 (entered into force Jan. 3, 1976) [hereinafter ICESCR]. Similarly, the U.S. Constitution protects the right to free expression and property, amends. I and V, but the Constitution also gives Congress authority to enact patent and copyright law, Art. 1, § 8.

3. *See generally*, Holger Hestermeyer, Human Rights and the WTO: The Case of Patents and Access to Medicines (examining the conflict between WTO law, specifically patent law, and international human rights law); Aurora Plomer, Patents Human Rights and Access to Science (Edward Elgar Pub. 2015) (examining the challenges posed by the modern patent system to the human right to access the benefits of science); Jennifer Sellin, Access to Medicines (examining the interface of access to affordable medicines and patent protection from the perspective of international human rights law). A strong argument can be made that inventors do not have a human right in their output, *see, e.g.*, Jan Brinkhof, *On Patents and*

solved through various mechanisms that enable the public to enjoy protected works without the authorization of the right holder.[4] In virtually all countries, legislation includes limitations and exceptions to the rights conferred,[5] and international intellectual property agreements typically gives member states policy space to adopt such provisions.[6] In addition, vari-

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Human Rights, *in* A PARADOX, *supra* note 1, at 140 n.1 (noting how inalienable rights fit within some, but not all branches of intellectual property law)Nonetheless, the dominant view is that patents are a species of property rights. And even if they are only statutory, they present a clash with the right to share in scientific advancement. For an example of a court using human rights to ensure access, *see* Patricia Asero Ochieng v. Attorney General (2009) Pet. No. 409, ¶¶ 60–66 & 86–87 (H.C.K.) (Kenya) (partly using the international human right to health to find that certain articles of the country's Anti Counterfeit Law violate petitioner's human rights).

4. *See, e.g.*, S. Porsdam Mann, et al., *Advocating for Science Progress as a Human Right*, 115 PNAS 10820, 10821 (2022) (noting that most papers on the right to science discuss access rather than participation).

5. *See, e.g.*, 17 U.S.C. § 102(b) (excluding ideas from the ambit of copyright protection); Convention on the Grant of European Patents (European Patent Convention), art. 53(b), *opened for signature* Oct. 5, 1973, 1065 U.N.T.S. 199 (entered into force Oct. 7, 1977), *as amended by* Act revising the Convention on the Grant of European Patents of Nov. 29, 2000 (entered into force Dec. 13, 2007), its Implementing Regulations, Protocols, and Rules Relating to Fees [hereinafter EPC] (excluding certain diagnostic methods from patent protection); Bilski v. Kappos, 561 U.S. 593, 601 (2010) (excluding from patentability laws of nature, physical phenomena, and abstract ideas); 35 U.S.C. § 271(e) (allowing experiments on patented pharmaceuticals to generate data for market clearance). In many countries there are also external limits on how rights are exploited, *see, e.g.*, U.S. Dep't. of Justice and Fed. Trade Comm'n, *Antitrust Guidelines for the Licensing of Intellectual Property* (Jan. 12, 2017), https://www.ftc.gov/system/files/documents/public_statements/1049793/ip_guidelines_2017.pdf [https://perma.cc/82SB-9NYG] (detailing "the antitrust enforcement policy of the U.S. Department of Justice and Federal Trade Commission . . . with respect to the licensing of intellectual property protected by patent, copyright, and trade secret law, and of know-how"); *see also* HERBERT HOVENKAMP, MARK D. JANIS, AND MARK A. LEMLEY, IP AND ANTITRUST: AN ANALYSIS OF ANTITRUST PRINCIPLES APPLIED TO INTELLECTUAL PROPERTY (Aspen Law & Business 2002) (examining how intellectual property licensing agreements can raise antitrust issues); James Thuo Gathii, *Construing Intellectual Property Rights and Competition Policy Consistently with Facilitating Access to Affordable AIDS Drugs to Low-End Consumers*, 53 FLA. L. REV. 727, 728 (2001) (exploring the possibilities that the TRIPS Agreement offers to address the problem of access and affordability of drugs to low-end consumers facing life threatening illnesses).

6. *See, e.g.*, Marrakesh Agreement Establishing the World Trade Organization, Apr. 15, 1994, 1867 U.N.T.S. 154, 33 I.L.M. 1144 (entered into force Jan. 1, 1995) annex 1C (Agreement on Trade-Related Aspects of Intellectual

ous philanthropic and voluntary initiatives promote access to existing scientific developments; some also subsidize the development of new innovations. Among them are the Bill and Melinda Gates Foundation, Thomas Pogge's Health Impact Fund, public-private partnerships,[7] and alliances administered by the United Nations and other international organizations.[8]

There are, however, at least two difficulties with conceptualizing the commitment to allow everyone to benefit from scientific advancement as an interest in public access. First, access is then often confined to things that others have already created. To the extent that innovators respond to the monetary incentives offered by the intellectual property system, the innovation agenda is largely set by the demands of the rich.[9] Needs unique to the Global South are not addressed because it lacks the resources to pay the supracompetitive prices that intellectual property protection allows innovators to charge.

Property Rights) arts. 30 & 31 [hereinafter the TRIPS Agreement or TRIPS] (allowing WTO members to make cabined exceptions to the rights conferred and setting out the conditions under which they can permit other unauthorized uses); *see also id.*, art. 8 (allowing members to prevent abuse).

7. *See generally* MARGARET CHON, PEDRO ROFFE, & AHMED ABDEL-LATIF, THE CAMBRIDGE HANDBOOK OF PUBLIC-PRIVATE PARTNERSHIPS, INTELLECTUAL PROPERTY GOVERNANCE, AND SUSTAINABLE DEVELOPMENT (2018) (examining, through selective case studies, the relationships between public-private partnerships and intellectual property).

8. BILL &MELINDA GATES FOUNDATION, https://www.gatesfoundation.org [https://perma.cc/Q5C4-S5XX] (last visited Apr. 2, 2023).; *Health Impact Fund: Delinking the price of drugs from the cost of research,* HEALTH IMPACT FUND, https://healthimpactfund.org/en/ [https://perma.cc/Y6P3-DLZH] (last visited Mar. 1, 2023); U.N. DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS, SUSTAINABLE DEVELOPMENT, THE PARTNERSHIP PLATFORM, https://sdgs.un.org/partnerships [https://perma.cc/HQ4A-FKSE] (last visited Feb. 26, 2020) (866 voluntary commitments and multi-stakeholder partnerships relate to SDG 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation).

9. To be sure, there are also advances that are made through other mechanisms, such as aforementioned initiatives, *supra* notes 7–8, and through international assistance and cooperation programs, *see generally* Takhmina Karimova, *The Nature and Meaning of 'International Assistance and Cooperation' under the International Covenant on Economic, Social and Cultural Rights*, *in* ECON., SOC., AND CULTURAL RIGHTS IN INT'L LAW: CONTEMP. ISSUES AND CHALLENGES 163 (Eibe Reidel ed., Oxford University Press 2014) (examining "the concept and meaning of international assistance and cooperation" under the U.N. Charter and Article 2(1) of the ICESCR). However, the patent regime accounts for many advances needed in the modern age.

Second, this framing deprives those in the South of their dignity: because essential products are so often protected by intellectual property, they must, in most cases, rely on the "kindness of strangers" to fulfill their needs.[10]

The COVID-19 pandemic furnishes a dramatic illustration of both problems. Vaccines were quickly discovered, but the most effective required a type of storage available only in wealthy nations. The "last-mile" problem—developing vaccines that could be distributed and administered to impoverished populations in the absence of sophisticated infrastructure—was largely ignored. Further, despite the best efforts of COVAX, GAVI, the World Health Organization, and other institutions dedicated to global health, vaccine nationalism took hold, leaving those in developing countries largely in the lurch.[11] Admittedly, international lawmakers eventually recognized the need to increase manufacturing capacity. In a Ministerial Decision, the World Trade Organization (WTO) allowed states to waive patent obligations under the TRIPS Agreement "to the extent necessary to address the COVID-19 pandemic."[12] But it took over two years for the waiver to be promulgated. During that period, the virus mutated and vaccine hesitancy grew to the point where more doses were available than there were people willing to be immunized.[13] The waiver also betrayed a miserly approach to access: it applied only to vaccines, not to diagnostics, treatments, or protective and storage equipment, all of which will surely remain both crucial and scarce. It was also confined to patents and market clearance data, not to the trade secrets that are needed in the production and distribution process.[14] To add insult to injury,

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10. Tennessee Williams, A Streetcar Named Desire (1947).

11. Thomas J. Bollyky & Chad P. Bown, *The Tragedy of Vaccine Nationalism*, 99 Foreign Affairs 96 (2020).

12. Draft Ministerial Decision on the TRIPS Agreement, WT/MIN(22)/W/15/Rev.2 (June 17, 2022) [hereinafter Draft Ministerial Decision].

13. David E. Adler, *To Vaccinate the World, Supply Is Only Half the Issue*, Foreign Policy (Jul. 20, 2021, 10:25 AM), https://foreignpolicy.com/2021/07/20/wto-trips-waiver-vaccine-equity-distribution-covid-pandemic/ [https://perma.cc/K92N-Q9U2].

14. Draft Ministerial Decision, *supra* note 12, para.1 & n.2. On the importance of transferring trade secrets and expanding the waiver, *see* Siva Thambisetty, Aisling McMahon, Luke McDonagh, Hyo Yoon Kang, & Graham Dutfield, *Addressing Vaccine Inequity During the COVID-19 Pandemic: The TRIPS Intellectual Property Waiver Proposal And Beyond*. 81 Cambridge L.J. 384

the waiver was opposed partly on the ground that developing countries would not, in any event, have the capacity to manufacture vaccine for themselves.[15]

The pandemic experience suggests the need for a more capacious conception of human rights—one suited to an age in which emerging problems are often solved technologically. The right enshrined in the UDHR to "share in scientific advancement" must, in short, be re-interpreted as the right to more than simply *access* to scientific advances. Rather, it must include the right to *participate* in the enterprise of doing science.[16] Recast in this way, the right would invigorate state efforts to enact laws that enable potential innovators to learn from others, build on their work, adapt that work to local needs, achieve recognition for their contributions, acquire the capacity to fulfill unmet local demand, and innovate at the knowledge frontier.

Recognizing a right to participate in science would also have advantages at the international level. The aforementioned policy space available in international law is narrowing through the ways existing agreements have been interpreted, by continued efforts to increase protection for innovators, and on account of procedural developments with unappreciated substantive consequences. Recognizing the right to do science as fundamental to human development would slow (if not reverse) this process and allow states to build their own technological capacity. Moreover, it would boost efforts to acknowl-

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(2022) (arguing that "the TRIPS waiver proposal should be viewed as offering a necessary and proportionate legal measure for clearing intellectual property barriers that cannot be achieved by existing TRIPS flexibilities."). The problem here is that while patent disclosures may reveal a way to make the protected product, they do not necessarily reveal the way to make the specific formulation approved by regulatory authorities for marketing.

15. Reto Hilty et al., *Covid-19 and the Role of Intellectual Property*, MAX PLANCK INST. FOR INNOVATION AND COMPETITION RSCH. PAPER SERIES, 4 (May 7, 2021), https://papers.ssrn.com/sol3/papers.cfm?abstract_id=3841549 [https://perma.cc/V5HN-VWBR].

16. *Cf.* Econ. & Soc. Council, Comm. on Econ., Soc. & Cultural Rts., General Comment 25 (Sixty-seventh session), Compilation of General Comments and General Recommendations Adopted by Human Rights Treaty Bodies, U.N. Doc. E/C.12/GC/25 (2020) (urging states to establish programs to ensure that a scientific education is available without discrimination, to support research aimed at the needs of the disadvantaged, and to protect the freedom to do science) [hereinafter ICESCR Report].

edge the contributions inventors in the South are already making to the knowledge base.[17] The pandemic disrupted global value chains, created an economic slowdown, and led the Global North to enact laws to maintain its resilience in crucial technologies.[18] A more expansive understanding of the human right to science would give the South the capacity to do the same.

This article highlights the role that a human right to participate in science could play in international patent law. Part II describes developments in that law that have reduced the flexibilities available to the South, and Part III shows how these changes have impeded national efforts to catch up to the knowledge frontier and become technologically self-reliant. Part IV discusses the budding recognition of a human right to participate in science and demonstrates its potential impact on international patent and trade secrecy law. While there are other forms of intellectual property law, such as copyright protection, that can also constitute obstacles to technological advancement, human rights perspectives on these regimes have

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17. Examples include the efforts of the WIPO Intergovernmental Committee on Intellectual Property and Genetic Resources, Traditional Knowledge and Folklore, WIPO WORLD INTELL. PROP. ORG., INTERGOVERNMENTAL COMM., https://www.wipo.int/tk/en/igc/ [https://perma.cc/3HN8-NZDQ] (last visited Feb. 12, 2023).

18. Eleftherios Iakovou & Chelsea C. White III, *How to Build More Secure, Resilient, Next-gen U.S. Supply Chains, Tech Stream*, BROOKINGS (Dec. 3, 2022), https://www.brookings.edu/techstream/how-to-build-more-secure-resilient-next-gen-u-s-supply-chains/ [https://perma.cc/ERK2-HVP3]; Nelson D. Schwartz, *Supply Chain Woes Prompt a new Push to Revive U.S. Factories*, N.Y. TIMES (Jan. 6, 2022), https://www.nytimes.com/2022/01/05/business/economy/supply-chain-reshoring-us-manufacturing.html [https://perma.cc/EU3P-DT2W]; Amy Haimerl, *Weary of Snarls, Small Businesses Build Their Own Supply Chains*, N.Y. TIMES (Oct. 19, 2022), https://www.nytimes.com/2022/10/19/business/small-businesses-supply-chain.html [https://perma.cc/S46D-QU2K]. The US CHIPS and Science Act, P.L. 117–167 (2022), exemplifies these efforts. It is intended to "strengthen American manufacturing, supply chains, and national security, and invest in research and development, science and technology, and the workforce of the future," *see FACT SHEET: CHIPS and Science Act Will Lower Costs, Create Jobs, Strengthen Supply Chains, and Counter China*, THE WHITE HOUSE (Aug. 9 2022), https://www.whitehouse.gov/briefing-room/statements-releases/2022/08/09/fact-sheet-chips-and-science-act-will-lower-costs-create-jobs-strengthen-supply-chains-and-counter-china/#:~:text=Today2C%20President%20Biden%20will%20sign,for%20the%2021st%20century [https://perma.cc/7BZU-C877].

been studied by others.[19] The literature has largely ignored patent and trade secrecy laws. Accordingly, this article focuses on that question.

II. LIMITATIONS ON CAPACITY BUILDING

It is not as though countries that are behind the knowledge frontier have not tried to get into the science game. Some have pursued what Jerry Reichman calls "fair following" by supporting local industries that copy existing works.[20] Other states have relied on foreigners to invest in technological development within their territories, particularly by requiring foreign patent holders to manufacture locally.[21] In both cases, the jobs created help train local workers, enhance their technological sophistication, and enable them to acquire the skills needed to become innovators in their own right. Both approaches can be useful, but only up to a point. Fair following and local manufacturing are profitable when labor costs are low. However, as workers move along the technology spectrum, their labor becomes more costly and manufacturing may shift to countries where people will work for less.[22]

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19. *See, e.g.*, The World Intellectual Property Organization Copyright Treaty, Dec. 20, 1996, S. Treaty Doc. No. 105-17, 36 I.L.M. 65 (recognizing in its Preamble "the need to maintain a balance between the rights of authors and the larger public interest, particularly education, research and access to information"). *See also infra* text accompanying notes 127–132.

20. *See generally* J.H. Reichman, *From Free Riders to Fair Followers: Global Competition under the TRIPS Agreement*, 29 N.Y.U. J. INT'L L. & POL. 11 (1997) (describing how developing countries can benefit from becoming "fair followers" within the framework of the TRIPS agreement in the worldwide quest for technical innovation).

21. *See* David M. Haug, *The International Transfer of Technology: Lessons That East Europe Can Learn from the Failed Third World Experience*, 5 HARV. J.L. & TECH. 209, 218 (1992) (explaining investment agreements between transitional corporations and developing countries but describing these agreements as a sort of "technological colonialism" which resulted in limited actual transfer of technology).

22. *See* Rochelle C. Dreyfuss & Daniel Benoliel, *Technological Self-Sufficiency and the Role of Novelty Traps*, 24 VAND. J. ENTER. & TECH'Y L. 441, 451 (2022) [hereinafter Novelty Traps] (explaining that, over time, "the workers with imitative skills demand higher pay, and countries with even lower wage scales develop the skills to compete in the same sector."); Daniel Benoliel & Rochelle C, Dreyfuss, *Patents and Global Inequality*, *in* IP, INNOVATION AND GLOBAL INEQUALITY (Daniel Benoliel ed., forthcoming). To be sure, countries with sources of wealth and large markets can pursue other strategies.

Better, then, is to focus efforts on adapting foreign inventions to local needs.[23] This strategy deals with the last-mile problem and exploits the comparative advantage that locals possess in knowing what they need. Fostering incremental innovation also creates a rung on the inventiveness ladder that may be closer to domestic inventors' initial capabilities. But this strategy can be expensive: it requires investment not only in research, but also in educating potential consumers about the benefits of adopting new products, and helping purchasers—as well as local manufacturers, distributors, and maintenance organizations—understand how to use and maintain them. For that reason, those who have studied capacity building suggest that countries pursuing this strategy adopt patent systems that ensure that local innovators can capture returns on their investments.[24] To a large extent, however, the availability of all these activities—learning by doing through fair following and local working, research on existing technologies, and devising a system to grant exclusive rights to locals based on local achievements—has become increasingly uncertain as the international patent system has evolved.

It is not entirely obvious why this should be so. The earliest multilateral agreement involving patents, the Paris Convention, imposed primarily procedural obligations on Member

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For example, China invested heavily in several technology sectors in which it became a leader, *see, e.g.*, Peter K. Yu, Jorge L. Contreras, & Yang Yu, *Transplanting Anti-Suit Injunctions*, 71 AM. U. L. REV. 1537, 1571–72 (2022) (describing China's state-supported technological standardization efforts in the wireless sector).

23. *See generally* KEUN LEE, SCHUMPETERIAN ANALYSIS OF ECONOMIC CATCH-UP: KNOWLEDGE, PATH-CREATION AND THE MIDDLE-INCOME TRAP (2013) (proposing that middle-income countries specialize in sectors with frequently emerging new technologies); *see also* KEUN LEE, THE ART OF ECONOMIC CATCH-UP: BARRIERS, DETOURS, AND LEAPFROGGING IN INNOVATION SYSTEMS (2019) (recommending that new technologies be implemented carefully within national innovation systems).

24. *See Novelty Traps*, *supra* note 22, 442–447 (arguing that "without an incentive system geared to local inventive capacities, the ecosystem required to support entrepreneurship and risk-taking, human capital formation, as well as capital accumulation and investment, is likely to be inadequate"). *See also* Nagesh Kumar, *Intellectual Property Rights, Technology and Economic Development: Experiences of Asian Countries*, 38 ECON. & POL. WKLY 209, 217 (2003) (discussing this strategy as a crucial lesson learned from the experiences of East Asian countries).

States.[25] It did not include a requirement that members adopt a patent regime. For many years, the World Intellectual Property Organization (WIPO) hosted negotiations over a proposed Substantive Patent Law Treaty (SPLT), which would have led to a degree of substantive convergence.[26] But those negotiations failed in large part because developing countries understood that most patents would go to foreigners, patenting would raise prices, and locals would not enjoy offsetting benefits.[27]

Negotiations over substantive commitments to patent protection eventually shifted to the trade arena, where the opportunity for trade concessions persuaded developing countries to join the WTO and implement the TRIPS Agreement's requirements for patent protection.[28] However, TRIPS is a minimum standards agreement and was justified as innovation-promoting.[29] Higher standards of protection would, it was said, encourage technology transfer and direct foreign investment in innovation-related activities.[30] TRIPS also included many flex-

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25. Paris Convention for the Protection of Industrial Property, arts. 2 and 4, Mar. 20, 1883, 21 U.S.T. 1583, 828 U.N.T.S. 305 [hereinafter Paris Convention].

26. *See* Rochelle Dreyfuss & Jerome Reichman, *WIPO's Role in Procedural and Substantive Patent Law Harmonization*, *in* RESEARCH HANDBOOK ON THE WORLD INTELLECTUAL PROPERTY ORGANIZATION 108, 119–124 (Sam Ricketson, ed., Edward Elgar Pub. 2020) (describing the negotiation process of the Committee of Experts on the Harmonization of Certain Provisions in Laws for the Protection of Inventions regarding the SPTL).

27. *See id.*, (explaining that the interests of developing countries had been "sidelined" during the negotiations, in favor of a Euro-centric model); Draft Substantive Patent Law Treaty, WIPO, https://www.wipo.int/patent-law/en/draft_splt.htm [https://perma.cc/HQK6-59L8] (last visited Mar. 30, 2023).

28. TRIPS, *supra* note 6, arts. 27–34.

29. *See* SUSAN K. SELL, PRIVATE POWER, PUBLIC LAW: THE GLOBALIZATION OF INTELLECTUAL PROPERTY RIGHTS 13 (2003) (explaining that the rationale behind TRIPS was that it would promote economic development worldwide).

30. TRIPS, *supra* note 6, art. 66(2); *see* Carlos M. Correa, *Can The TRIPS Agreement Foster Technology Transfer to Developing Countries?*, *in* INT'L PUB. GOODS AND TRANSFER OF TECH. UNDER A GLOBALIZED INTELL. PROP. REGIME 227, 231 (Keith E. Maskus & Jerome H. Reichmann eds., 2010) (stating that "[w]here cutting-edge and easy to imitate technologies are at stake, such as in the case of biotechnology-based products, and where ''tacit,'' noncodified knowledge is an essential component of the technology package, transfer is more likely to take place if it is bundled with patents and other IPRs.").

ibilities. In addition to measures allowing WTO members to recognize certain unauthorized uses of patented materials,[31] it left states free to adopt their own methods of implementation and to define key terms, such as the "new" (novelty) and "inventive step" (nonobviousness) requirements for patent protection.[32] Furthermore, TRIPS incorporated by reference the Paris Convention, which allowed nations to require right holders to work their patents locally.[33] Most important, the TRIPS Agreement stated that its objectives and underlying principles included improving social welfare and promoting technological development.[34]

Nonetheless, TRIPS did not lead to advancement in most developing countries. In part, the problems the South encountered were not related to intellectual property commitments. Rather, even though the WTO agreements enlarged markets, the trade benefits of joining up did not fully materialize.[35] There was also less technological transfer and direct foreign investment than anticipated.[36] Moreover, as Joseph Stiglitz and others have suggested, increasing financial incentives was in-

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31. TRIPS, *supra* note 6, arts. 30–31.

32. *Id.*, arts. 1 & 27.

33. *Id.*, art. 2; Paris Convention, *supra* note 25, art. 5 (allowing states, after a period of time and subject to certain conditions, to require patent holders to use their patented processes and make their patented products within their borders).

34. TRIPS, *supra* note 6, arts 7–8. *See generally*, Peter K. Yu, *The Objectives and Principles of the TRIPS Agreement*, 46 HOUS. L. REV. 979 (2009) (explaining how "Articles 7 and 8 [of the TRIPS Agreement] can play multiple roles in helping less-developed countries preserve the hard-earned bargains they won through the TRIPS negotiations.").

35. *See* Michael H. Davis & Dana Neacsu, *Legitimacy, Globally: The Incoherence of Free Trade Practice, Global Economics and Their Governing Principles of Political Economy*, 69 UMKC L. REV. 733, 775–776 (2001) (arguing that the GATT/WTO structure of international trade leads to an uneven furtherance of states' interests which is being "especially disadvantageous for less developed countries.").

36. *See generally* David M. Fox, *Technology Transfer and the TRIPS Agreement Are Developed Countries Meeting Their End of the Bargain?*, 10 HASTINGS SCIENCE & TECH. L. J. 1 (2019) (looking "critically at Article 66.2 of the TRIPS Agreement and discuss[ing] whether developed countries are ensuring the successful flow of technology to resource-poor countries."). For a general discussion, *see* Keith E. Maskus, *The Role of Intellectual Property Rights in Encouraging Foreign Direct Investment and Technology Transfer*, 9 DUKE J. COMP. & INT'L L. 109 (1998) (discussing "issues of attracting FDI and technology, with a particular emphasis on the role of IPRs in this process.").

sufficient to spur innovation in countries that also lacked the institutions needed to develop human capital, the infrastructure required to conduct research, the means to accumulate funds to invest in inventive enterprises, bankruptcy protection to mitigate risk, or reliable judicial systems in which to enforce rights.[37]

Still, intellectual property obligations bear some responsibility for thwarting developing countries' efforts to catch up. The WTO took an approach to interpreting the TRIPS Agreement that narrowed the policy space available to member states.[38] Additionally, while developing countries may have thought that meeting their TRIPS obligations meant that stronger protection would not be demanded, many were later pressured to do more, through either unilateral threats of trade sanctions or regional or bilateral agreements with new commitments.[39] Furthermore, and perhaps less recognized, efforts to streamline procedures for obtaining protection accelerated convergence on substantive law.

A. *Interpreting TRIPS Commitments*

Shifting negotiations from WIPO to the WTO produced one major change in the intellectual property regime: for the first time, noncompliance could be challenged in state-to-state

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37. JOSEPH E. STIGLITZ, GLOBALIZATION AND ITS DISCONTENTS (W.W. Norton 2002); Peter K. Yu, *Intellectual Property, Economic Development, and the China Puzzle* 173, 213–16, *in* INTELLECTUAL PROPERTY, TRADE AND DEVELOPMENT: STRATEGIES TO OPTIMIZE ECONOMIC DEVELOPMENT IN A TRIPS PLUS ERA (Daniel J. Gervais ed., 2007) (discussing the importance of an "enabling environment").

38. *See generally* GRAEME B. DINWOODIE & ROCHELLE C. DREYFUSS, A NEOFEDERALIST VISION OF TRIPS: THE RESILIENCE OF THE INTERNATIONAL INTELLECTUAL PROPERTY REGIME 49–82 (2012) (discussing the rigid approach the WTO takes to the interpretation of TRIPS provisions). *See also* Molly Land, *Rebalancing TRIPS*, 33 MICH. J. INT'L L. 433 (2012) (making similar observations).

39. *See* Henning Grosse Ruse-Khan, *The International Law Relation Between TRIPS and Subsequent TRIPS-Plus Free Trade Agreements: Towards Safeguarding TRIPS Flexibilities?*, 18 J. INTELL. PROP. L. 325 (2011) (discussing the relationship between TRIPS and later agreements); *see also* Sarah R. Wasserman Rajec, *The Harmonization Myth in International Intellectual Property Law*, 62 ARIZ. L. REV. 735, 756 (2020) (explaining that, upon conclusion of the TRIPS agreement developed countries stepped up efforts to tailor protection through forum-shifting and bilateral or regional trade agreements).

dispute resolution.[40] The outcomes were surprising to many in the intellectual property community. The Dispute Settlement Body (DSB) decided intellectual property cases with tools that had been developed in trade disputes arising under the General Agreement on Tariffs and Trade (GATT),[41] without regard to the difference between trade questions, which largely deal with problems at national borders, and intellectual property matters, which reach deep within a country's territory to have a direct impact on culture and social welfare.[42]

1. *The Quantitative Impulse*

Perhaps the most obvious legacy of the GATT's trade focus is the DSB's use of quantitative measures. This was particularly evident in two cases challenging exceptions to copyright and patent protection, where a state relying on the "Exceptions" provisions of TRIPS had to show three things: that the exception was "limited" (or in copyright, "special"), that it did not conflict with normal exploitation, and that it did not prejudice the legitimate interests of the right holder (in the patent provision, "unreasonably" conflict, taking into account the interests of third parties).[43] In the copyright Exceptions case, *US-110(5)*, the DSB panel's analysis largely consisted of counting the number of establishments that could potentially rely on the challenged exception and the number of states with similar measures.[44] In the patent case, *Canada-*

40. *See* Rochelle Cooper Dreyfuss & Andreas F. Lowenfeld, *Two Achievements of the Uruguay Round: Putting TRIPS And Dispute Settlement Together*, 37 VA. J. INT'L L. 275 (1997) (discussing the potential impact of dispute settlement on the interpretation of international intellectual property law).

41. *See* General Agreement on Tariffs and Trade (Geneva, Oct. 30, 1947) 55 U.N.T.S. 194, *provisionally entered into force* Jan. 1, 1948, *superseded by* Final Act Embodying the Results of the Uruguay Round of Multilateral Trade Negotiations (Marrakesh, Morocco, Apr. 15, 1994), 1867 U.N.T.S. 14, 33 I.L.M. 1143, *entered into force* Jan. 1, 1995 [hereinafter GATT].

42. *See generally* CAROLYN DEERE, THE IMPLEMENTATION GAME: THE TRIPS AGREEMENT AND THE GLOBAL POLITICS OF INTELLECTUAL PROPERTY REFORM IN DEVELOPING COUNTRIES (2008) (explaining that IP power politics occur not just within trade questions but afterwards when countries implement agreements).

43. TRIPS, *supra* note 6, arts. 13 & 30.

44. Panel Report, *United States-Section 110(5) of the U.S. Copyright Act*, WTO Doc. WT/DS160/R (adopted June 15, 2000) [hereinafter US-110(5) Report]. On the number of establishments, see, for example, ¶¶ 6.121, 6.193, 6.208, 6.240; on norms, see ¶¶ 6.57–.58.

Pharmaceuticals, the panel counted the number of rights in the patent bundle that were affected by the challenged use and rejected one exception because it lacked numerical limits on its use.[45]

2. *Narrowing Flexibilities*

As important, the three-part Exceptions tests for copyright and patent rights could have been interpreted as a sliding scale, which would have given states the flexibility to compensate for greater harm along one dimension by showing less harm in another.[46] But the panels held that the three parts were cumulative and that each must be satisfied individually.[47] Accordingly, once the *Canada-Pharmaceuticals* panel found that an exception was not limited, it never considered the other conditions mentioned in the provision. Thus, in considering a Canadian law allowing firms to stockpile generic drugs in anticipation of patent expiry, the panel never reached the last phrase, which would have allowed it to take account of the interests of patients and the healthcare system, both of which would have benefited from making affordable generic drugs available sooner.[48] To be sure, the panel approved a second measure in that case, one that allowed generic firms to conduct, during the patent term, the research needed to prove bioequivalence (that is, to show that the generic version of a drug is medically equivalent to the patent holder's product). But even here, the interest in controlling costs did not enter the analysis. Rather, the panel approved this exception upon a finding that the research output only affected exclusivity after

45. Panel Report, *Canada-Patent Protection of Pharmaceutical Products*, ¶ 7.33–.36, WTO Doc. WT/DS114/R (adopted Mar. 17, 2000) [hereinafter Canada-Pharmaceuticals Report].

46. For an example of this methodology, see Barton Beebe, *An Empirical Study of U.S. Copyright Fair Use Opinions, 1978-2005*, 156 U. PA. L. REV. 549 (2008) (demonstrating how the subfactors in a fair use analysis are used in US courts).

47. Canada-Pharmaceuticals Report, ¶ 7.20; US-110(5) Report, ¶ 6.74,

48. *See* DINWOODIE & DREYFUSS, *supra* note 38, at 80 (explaining that in not considering the last step, the panel did not appear to understand that "the Exceptions provisions [of the TRIPS agreement] were included in order to give states leeway to balance proprietary interests against access considerations.").

the patent had expired and thus did not interfere with rights or interests protected under the TRIPS Agreement.[49]

US-110(5) was similar. Although the United States had argued that the word "special" implied that an exception could be justified by the social interests it furthered, the panel interpreted the term "special" as equivalent to "limited."[50] And again, the panel interpreted the three-part test as cumulative. Furthermore, neither panel gave normative content to terms like "normal" or "unreasonable."[51]

The DSB cabined flexibilities in other ways as well. States might have satisfied the "limited" condition by targeting particular industries. However, the *Canada-Pharmaceuticals* panel also cumulated other obligations imposed by the TRIPS Agreement. Thus, simultaneously with demonstrating that its exception was "limited," Canada had to show that its measure did not discriminate by "field of technology."[52] In another case on discrimination, this time on the requirement of according no less favourable treatment to the nationals of other Member States, the *EC-GI* panel held that both *de jure* and *de facto* discrimination were actionable.[53] Along similar lines, in *Havana Club*, the DSB held that even though the U.S., Cuban and other foreign holders of Cuba-derived trademarks suffered the same (negative) outcome when they tried to register their marks in the United States, the United States nonetheless violated both the national treatment guarantee (because its registration requirements treated US applicants differently from

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49. Canada-Pharmaceuticals Report, ¶¶ 7.54–58.

50. US-110(5) Report, ¶¶ 6.103 & 6.111–.112.

51. Jane C. Ginsburg, *Toward Supranational Copyright Law? The WTO Panel Decision and the "Three Step Test" for Copyright Exemptions*, 187 REVUE INTERNATIONALE DU DROIT D'AUTEUR 3, 17 (2001).

52. TRIPS, *supra* note 6, art. 27.1 (stating that "patents shall be available and patent rights enjoyable without discrimination as to the place of invention, the field of technology and whether products are imported or locally produced."); Canada-Pharmaceuticals Report, ¶ 7.91.

53. TRIPS, *supra* note 6, art. 3 (stating that "[e]ach Member shall accord to the nationals of other Members treatment no less favourable than that it accords to its own nationals with regard to the protection of intellectual property."); *Panel Report, European Communities-Protection of Trademarks and Geographical Indications for Agricultural Products and Foodstuffs*, WT/DS174/R (Mar. 15, 2005), paras. 7.183–7.218 [hereinafter EC-GI Report] (finding, as a preliminary conclusion, less favorable treatment on the basis of *de facto* discrimination).

foreign applicants) and the most favoured nation (MFN) guarantee (because the regulations treated Cubans differently from other foreigners).[54]

3. *Downgrading Objectives and Principles*

But perhaps most surprising was the way the *Canada-Pharmaceutical* panel handled the TRIPS provisions on objectives and principles.[55] The Vienna Convention on the Law of Treaties requires adjudicators to interpret international agreements "in light of [their] object and purpose."[56] On the whole, the WTO has followed that approach.[57] However, the *Canada-Pharmaceuticals* panel agreed only that object and purpose should be kept in mind in interpreting the Agreement: it did not see these provisions as effectuating what it called "a renegotiation" of the overall balance that it thought the TRIPS Agreement had struck.[58] The promises these provisions made regarding social welfare did not, in short, dissuade WTO adjudicators from taking a literal, cumulative, and quantitative approach to interpretation.

B. *Other International Commitments*

Even if states could work with the ways in which the DSB narrowed TRIPS flexibilities, TRIPS wasn't the end of the line. The United States and others have used the threat of trade sanctions to require adherence to an aggressive view of intellectual property rights.[59] And a slew of bilateral and regional

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54. Appellate Body Report, *United States-Section 211 Omnibus Appropriations Act of 1998,* ¶¶ 252–68, WTO Doc. WT/DS176/AB/R (adopted Jan. 2, 2002) [hereinafter Havana Club Report].

55. TRIPS, *supra* note 6, arts. 7–8. For a comprehensive discussion of the problems with the panel report, *see* Robert Howse, *The Canadian Generic Medicines Panel: A Dangerous Precedent in Dangerous Times*, 3 J. WORLD INTELL. PROP'Y 493 (2000).

56. Vienna Convention on the Law of Treaties, art. 31.2 (May 23, 1969), 1115 U.N.T.S. 331, 8 I.L.M. 679, *entered into force* Jan. 27, 1980.

57. Susy Frankel, *The WTO's Application of "the Customary Rules of Interpretation of Public International Law" to Intellectual Property*, 46 VA. J. INT'L L. 365, 385–87 (2006).

58. Canada-Pharmaceuticals Report, ¶¶ 7.25–26.

59. *See generally*, Judith H. Bello & Alan Holmer, *"Special 301": Its Requirements, Implementation, and Significance*, 13 FORDHAM INT'L L.J. 259 (1990) (discussing how Special 301 requires the U.S. Trade Representative to identify countries with weak intellectual property protection which have an adverse

trade agreements have further upped the ante, especially for pharmaceuticals.[60] Of course, it remains to be seen how these so-called TRIPS-plus agreements will be interpreted. Since many include references to TRIPS and the flexibilities that TRIPS provides, arguably the policy space left in TRIPS (such as it is) should carry over.[61] However, there are several places where norms appear to conflict, where post-TRIPS Agreements seem specifically designed to exceed the minimum standards in TRIPS, and where burdens of proof have been reassigned in ways that disfavor state interests in flexibility.[62] Moreover, in at least one situation, the United States used a certification procedure to ensure that an agreement was implemented to its satisfaction.[63] As noted by Carlos Correa, in

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effect on U.S. products, and such identification may in turn lead to retaliation against such country if it refuses to reform its practices satisfactorily). The European Union has adopted a similar approach, *see Communication From the Commission to the European Parliament, The Council and the European Economic and Social Committee on Trade, Growth and Intellectual Property - Strategy for the Protection and Enforcement of Intellectual Property Rights in Third Countries*, COM (2014) 389 final (July 1, 2014) (explaining measures to be taken against countries "that persistently break international commitments on IP rules in ways that have a major impact on the EU, and where the authorities are unwilling to cooperate or where cooperation shows limited results.").

60. *See generally* Susan K. Sell, *TRIPS Was Never Enough: Vertical Forum Shifting, FTAs, ACTA, and TPP*, 18 J. INTELL. PROP. L. 447 (2011) (discussing proliferation of multilateral health treaties and implications with respect to forum shifting). *See, e.g.*, Dominican Republic–Central America–United States Free Trade Agreement, art. 15:10, Jan. 28, 2004, 43 I.L.M. 514 (elaborating on ambiguities in TRIPS, art. 39.3, on the use of undisclosed information).

61. *See* Ruse-Khan, *supra* note 39, at 333–39 (citing, among other things, U.N. Int'l L. Comm'n, *Conclusions of the Work of the Study Group on the Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law*, P 1, U.N. Doc A/CN.4/L.702 (2006) (prepared by Martii Koskenniemi)).

62. *Id.*, at 339–50; *see also* Henning Grosse Ruse-Khan, *Challenging Compliance with International Intellectual Property Norms in Investor–State Dispute Settlement*, 19 J. INT'L ECON. L. 241 (2016) (demonstrating the many substantive and procedural differences between state-state adjudication in the WTO and investor state adjudication under investment agreements).

63. *See, e.g.*, Dominican Republic–Central America–United States Free Trade Agreement Implementation Act, § 101(b), Pub. L. 109–53, 19 Stat. 462, 109th Congress (2005) (conditioning the entry into force of the agreement on the relevant countries having "taken measures necessary to comply with the provisions of the Agreement that are to take effect on the date on which the Agreement enters into force."). Similar provisions can be found in

that process, the United States demanded even more than the agreement required.[64]

As important, while TRIPS dispute resolution is exclusively the prerogative of Member States, many international investment agreements (IIAs) give individual investors the power to challenge national legislation before arbitral tribunals. These investor-state dispute settlement (ISDS) cases raise claims about whether national limitations on intellectual property assets constitute expropriations or denials of fair and equitable treatment.[65] Although the state won in each of the few ISDS disputes brought so far,[66] ISDS nonetheless raises serious concerns. Investment tribunals have decided many important issues on the facts, leaving key legal questions unresolved. These include questions about what constitutes a denial of fair treatment; how the value allegedly expropriated should be calculated; the evidentiary support needed to prove that a measure is consonant with the state's objectives; and, most important in terms of its impact on proposed legislation, whether a change in the law is actionable on the ground that that it was not sufficiently foreseeable to investors.[67] With these questions

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U.S. FTAs with Chile, Oman, Singapore, and Bahrain. *See generally* David Vivas-Eugui & Johanna von Braun, *Beyond FTA Negotiations – Implementing the New Generation of Intellectual Property Obligations*, 18 ICTSD/UNCTAD/CINPE (2006), https://infojustice.org/wp-content/uploads/2016/01/vivas-and-von-braun.pdf [https://perma.cc/R7P5-KRVE] (noting generally that the US has included authorization provisions in other treaties).

64. Carlos M. Correa, *Mitigating the Regulatory Constraints Imposed by Intellectual Property Rules under Free Trade Agreements*, 6–8 SOUTH CENTRE RESEARCH PAPER 74 (Feb. 2017), https://www.southcentre.int/wp-content/uploads/2017/02/RP74_Mitigating-the-Regulatory-Constraints-Imposed-by-Intellectual-Property-Rules-under-Free-Trade-Agreements_EN-1.pdf [https://perma.cc/9WS9-L9SU].

65. For a discussion of the issues raised by ISDS adjudication of intellectual property disputes, see Rochelle Cooper Dreyfuss, *ISDS and Intellectual Property in 2019: The Case of the Dog that Didn't Bark*, *in* YEARBOOK ON INTERNATIONAL INVESTMENT LAW & POLICY 2019 247 (Lisa Sachs, Lise Johnson, & Jesse Coleman, eds., 2021).

66. The two cases centrally focused on intellectual property law are Eli Lilly and Company v. Gov't of Canada, ICSID Case No. UNCT/14/2, Final Award (Mar. 16, 2017); and Philip Morris Brands Sàrl v. Oriental Republic of Uruguay, ICSID Case No. ARB/10/7, Award, (July 8, 2016). A handful of other cases involved intellectual property assets, but none challenged a nation's intellectual property laws.

67. *See generally* Rochelle Dreyfuss & Susy Frankel, *From Incentive to Commodity to Asset: How International Law is Reconceptualizing Intellectual Property*, 36

unanswered, the cost of defending extremely high, and the cost of losing even higher, the threat of a challenge can be enough to chill legal experimentation.[68]

ISDS is also problematic because the relationship between investment guarantees and other obligations is unclear. Some observers see the minimum standards in TRIPS as imposing limits on investors' legitimate expectations.[69] However, most IIAs explicitly make TRIPS compliance a defense only in specified, narrow circumstances.[70] Thus, it may be that even if the DSB were to accept that a state had acted within a TRIPS flexibility, the state might still be at risk of an ISDS challenge. Compounding the problem, although states sometimes have reasons to desist from challenging the laws of other countries in the WTO, investors do not necessarily have the same compunctions. They may bring challenges that a state would not assert because, for example, it wants to preserve the flexibility at issue or because it is wary of public reaction.[71]

MICH. J. INT'L L. 557 (2015) (examining the flexibilities available under current instruments).

68. *See* Rochelle Dreyfuss & Susy Frankel, *Reconceptualizing ISDS: When is IP and Investment and How Much Can States Regulate It*, 21 VAND. J. ENT. & TECH. L. 377, 379–92 (2018) (explaining how some ISDS decisions "provide investors with a roadmap for using ISDS to chill legitimate IP-related regulation" and "to discourage states from furthering their domestic policies").

69. Henning Grosse Ruse-Khan & Federica Paddeu, *A TRIPS-COVID Waiver and Overlapping Commitments to Protect Intellectual Property Rights Under International IP and Investment Agreements*, 24 SOUTH CENTRE RESEARCH PAPER 144 (Jan. 2022), https://www.southcentre.int/research-paper-144-27-january-2022/ [https://perma.cc/F5L2-BJUA] (arguing for an integrated approach which would import TRIPS flexibilities into the interpretation of investment obligations).

70. *See, e.g.*, Free Trade Agreement between the United States of America and the Republic Of Korea, U.S.-S. Kor., art. 11.6(5), June 30, 2007–Feb. 21, 2012, https://ustr.gov/trade-agreements/free-trade-agreements/korus-fta/final-text [https://perma.cc/2GC5-2VZC] [hereinafter KORUS] (carving out an exception to expropriation protection in cases related to "the issuance of compulsory licenses granted in relation to intellectual property rights in accordance with the TRIPS Agreement").

71. Rochelle Cooper Dreyfuss, *Protecting Fundamental Values in International IP Disputes: Investor-State vs. WTO Adjudication*, *in* RESEARCH HANDBOOK ON INTELLECTUAL PROPERTY AND INVESTMENT LAW 318, 323–24 (Christophe Geiger, ed., Edward Elgar Pub. 2020).

C. *Procedural Spillover*

For the most part, the obstacles imposed by TRIPS and other substantive instruments are well recognized. Less appreciated is the substantive impact of procedural agreements. As described above, the Paris Convention largely tackled procedure and did not impose substantive obligations to offer patent protection.[72] While developing countries strongly resisted subsequent attempts in WIPO to negotiate a substantive agreement, they did not oppose procedural convergence. Indeed, many likely considered it benign, if not helpful. For example, the Patent Cooperation Treaty (PCT) allows inventors to begin the process of acquiring multinational rights with a single application, reviewed in a single patent office.[73] That office (called an International Searching Authority or ISA) identifies prior art (technical knowledge and information) relevant to determining whether the invention is novel and inventive and provides a written opinion on its patentability. The inventor can also ask for a supplementary search and assessment from a second ISA. Ultimately, every country in which protection is sought must review the application, but the ISA analyses can save them both money and examiner effort.

The PCT and subsequent procedural instruments are, however, something of a double-edged sword.[74] While they save examining office resources, they also make it much easier for inventors to apply for protection in multiple countries. As a result, inventions that might have once gone into the public domain in some countries may now be patented there.[75] Equally important, the increase in applications has led patent

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72. *See* Paris Convention, *supra* note 25 (imposing obligations only on countries that enacted patent protection).

73. Patent Cooperation Treaty, *opened for signature* June 19, 1970, 1160 U.N.T.S. 231 (entered into force Jan. 24, 1978), *amended* Sept. 28, 1979, *modified* Feb. 3, 1984 *and* Oct. 3, 2001.

74. Subsequent agreements include the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure, *opened for signature* Apr. 28, 1977, 1861 U.N.T.S. 361 (entered into force Aug. 19, 1980), *amended* Sept. 26, 1980, and the Patent Law Treaty, *opened for signature* June 1, 2000, 2340 U.N.T.S. 3, (entered into force Apr. 28, 2005).

75. *See, e.g.*, *PCT Yearly Review 2021-Executive Summary 2*, WIPO, https://www.wipo.int/edocs/pubdocs/en/wipo_pub_901_2021_exec_summary.pdf [https://perma.cc/ASD4-QF7R] (showing increasing use of the PCT over time).

offices, and the governments that must pay for them, to continually strive for more efficient processing. The outcome has been convergence on substantive law outside the channels in which harmonizing efforts are usually considered, debated, and contested.

The PCT furnishes one mechanism: the patent offices in some countries appear to be saving their resources by accepting the analyses provided by the ISAs. But ISA examinations cover only matters typically found in national laws; when a country's national office defers to them, it is essentially ignoring any unique provisions that the country may have enacted to further its own interests.[76] Another avenue derives from the promises that the WTO and WIPO have made to "build capacity" (by which they mean the capacity to examine applications) through training programs.[77] Many developing countries accepted the offer for training, and, as Peter Drahos has found, the trainees are frequently placed in the patent offices of developed countries.[78] There they are socialized to favor the law they observe, not the law of their own jurisdictions. When they go home, it is not always certain they will apply provisions unique to their national legal system.[79] A third path is the aptly named Patent Prosecution Highway (PPH) initiative, which began in the early 2000s to reduce the

76. *See, e.g.*, Bhaven Sampat & Tahir Amin, *How Do Public Health Safeguards in Indian Patent Law Affect Pharmaceutical Patenting in Practice?*, 38 J. HEALTH POLITICS, POL'Y & L. 735, 751 (2013) (indicating, after conducting an empirical study of the implementation of a unique provision of Indian patent law, that the law was having "a more limited effect on patent prosecution [in the Indian patent office] in practice than either their supporters or their critics suggest.").

77. *See* TRIPS, *supra* note 6, art. 67 (obligating developed countries to provide technical cooperation to developing countries and defining the obligation to include "support regarding the establishment or reinforcement of domestic offices . . . including the training of personnel.").

78. Peter Drahos, *"Trust Me": Patent Offices in Developing Countries*, 34 AM. J. L. & MED. 151 (2008). *See also* Caroline B. Ncube, *Three Centuries and Counting: the Emergence and Development of Intellectual Property Law in Africa*, *in* THE OXFORD HANDBOOK OF INTELLECTUAL PROPERTY LAW 409, 419–20 (Rochelle C. Dreyfuss & Justine Pila, eds., 2018) (describing the compliance overdrive of developing countries following the adoption of the TRIPS Agreement).

79. Drahos, *supra* note 78, at 167 (explaining that, since "developing country patent offices have, over a long period of time, been steadily integrated into an emerging system of global patent administration . . . they will be disposed to behave in ways that are likely to be pro-patent.").

backlog of applications. It operates by "fast tracking" applications that have already been examined in one participating patent office.[80] Subsequent examiners then use the first office's work product to make their own determinations. Outcomes have yet to be carefully studied, but to have a significant effect on backlogs, substantial deference to the first jurisdiction's law is likely occurring.[81] More informally, the five largest patent offices (IP5) meet on a regular basis to find ways to avoid unnecessary duplication of examining effort.[82] That includes finding substantive differences—and working to harmonize them.[83]

In addition to these "bottom up" forms of convergence, the proliferation of patent applications has had a "top down" effect. Several regions have pooled their examination efforts by establishing a single patent office, operating under agreed standards of patentability. The European Patent Convention (EPC) is the best known. It is implemented by the European Patent Office (EPO), which examines applications on behalf

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80. *Patent Prosecution Highway (PPH) – Fast Track Examination of Applications*, USPTO, https://www.uspto.gov/patents/basics/international-protection/patent-prosecution-highway-pph-fast-track [https://perma.cc/39DC-2XC5] (last visited Apr. 2, 2023); *see also PCT-Patent Prosecution Highway Program*, WORLD INTELLECTUAL PROP. ORG., https://www.wipo.int/pct/en/filing/pct_pph.html [https://perma.cc/YK24-53MY] (explaining the request procedure for accelerated processing) (last visited Apr. 2, 2023).

81. *See, e.g.*, Rana Gosain, *Recent Reform of Brazilian Pharmaceutical Patents Showing Results*, DANIEL (June 28, 2022), https://www.daniel-ip.com/en/articles/patents-articles/recent-reform-on-brazilian-pharmaceutical-patents-showing-results/ [https://perma.cc/2DE3-XY9J] (highlighting greater use of the PPH in Brazil through Brazil's decision to drop a unique provision in its patent law).

82. *See About IP5 co-operation*, FIVEIPOFFICES, https://www.fiveipoffices.org/about [https://perma.cc/ZX55-U3FG] (describing IP5's goals of eliminating unnecessary duplication of work, enhancing patent examination efficiency and quality, and guaranteed stability of a patent right) (last visited Apr. 2, 2023). The IP5 consists of the USPTO, the European Patent Office (EPO), the Japan Patent Office (JPO), the National Intellectual Property Administration for the People's Republic of China (CNIPA) and the Korean Intellectual Property Office (KIPO). It is an outgrowth of what was previously known as the Trilateral, https://www.trilateral.net/home [https://perma.cc/2H4C-27DB] (USPTO, EPO, and JPO) (last visited Apr. 2, 2023).

83. *See The Catalogue of Differing Practices*, IP5, https://www.fiveipoffices.org/material/cdp-1 [https://perma.cc/DPF5-GMEZ] (describing the catalogue as an effort to "support work-sharing and operational practice convergence between [Patent] Offices") (last visited Apr. 2, 2023).

of thirty-eight states, including all the members of the European Union, as well as a few "validation" states (states that are not members of the EPC, but accept EPO determinations). In Eurasia, several of the former members of the Soviet Union have a similar arrangement, while in Africa there are two systems, one for Anglo- and the other for Franco-phone countries.[84]

Efficiency considerations have produced other changes in national law as well. Novelty and disclosure furnish two examples. Novelty requirements can be implemented in one of two ways: the absolute approach bases determinations of whether an invention is new (and by extension, inventive) on the differences between the invention and every piece of art available anywhere in the entire world. In contrast, a relative standard considers only material that is reasonably available to local artisans. Examination on an absolute standard is easier for an ISA because it is not required to consider the application on a country-by-country basis, to determine which art is locally accessible. Accordingly, if nations wish to save resources by deferring to an ISA, they are better off switching from relative novelty to an absolute approach. Indeed, the United States made precisely that change in 2011.[85]

The disclosure requirement demands that the inventor include in the patent information sufficient to teach others in the field how to make and use the invention.[86] Even if multiple methods exist, only one need be disclosed. Nonetheless, at one time, some countries required more: that the inventor disclose the preferred way to carry out the invention.[87] Examin-

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84. Eurasian Patent Convention, *opened for signature* Sept. 9, 1994, (entered into force Aug. 12 1995), https://wipolex.wipo.int/en/treaties/details/228 [https://perma.cc/8YKV-YA3A]; Harare Protocol on Patents, Designs and Utility Models, *signed* Dec. 10, 1982 (entered into force Apr. 25, 1984), *amended most recently* Nov. 26, 2013, https://wipolex.wipo.int/en/treaties/details/204 [https://perma.cc/8RUL-MYD7] (for anglophone African countries); Bangui Agreement on the Creation of African Intellectual Property Organization, *signed* Mar. 2, 1977 (entered into force Feb. 8, 1982), *revised* Feb. 24, 1999, *amended most recently* Dec. 14, 2015, https://wipolex.wipo.int/en/treaties/details/227 [https://perma.cc/WMT7-4Z4K] (francophone African countries).

85. *Compare* 35 U.S.C. § 102(a) and (b) (1952 Act), *with* § 102(a) (2011 Act).

86. *See, e.g.*, 35 U.S.C. § 112 (a) (describing disclosure requirements).

87. *Id.*

ing a patent for "best mode" is difficult, however, because it requires the examiner to learn what the inventor knew at the time of the application. Because it is easier to determine only whether the disclosure enables the field, most countries have now abandoned the best mode requirement. The United States has not exactly eliminated it. However in 2011, the requirement became essentially unenforceable.[88]

III. The Impact on Capacity Building

As noted in Part II, countries seeking to build capacity tend to consider four strategies: encouraging fair following, promoting local production, supporting adaptation, and establishing protective regimes for local innovations. As the space to pursue innovative policy solutions was constrained by the developments discussed above, it has become increasingly unclear whether any of the four remains available.

A. *Fair Following*

Fair following presents a viable strategy for developing technological skills if the following is indeed fair and if there are places to sell the goods produced. India, for example, developed a vibrant generic drug industry before it was required by TRIPS to enact protection for pharmaceutical products. Multiple firms could compete on the development of manufacturing processes (which were patentable). That competition reduced the cost of producing pharmaceuticals and, as a result, lowered the price at which drugs could be profitably sold. India became known as the "pharmacy to the world" by selling in other countries where the drugs it manufactured were also unpatented.[89] With its extensive experience manu-

88. 35 U.S.C. §§ 112(a), 282(b)(3)(A) (barring claims regarding the adequacy of the best mode description from invalidating a patent). *See generally* Brian J. Love & Christopher B. Seaman, *Best Mode Trade Secrets*, 15 Yale J. L. & Tech. 1 (2013) (discussing how disclosure changed when the best mode requirement became unenforceable under patent law and suggesting other ways to force patent holders to reveal the best mode for practicing their inventions).

89. There is an extensive literature on the impact of the TRIPS Agreement on the Indian pharmaceutical industry. *See, e.g.*, Atsuko Kamlike, *The TRIPS Agreement and the Pharmaceutical Industry in India*, 32 J. Interdisciplinary Econ. 95 (2020) (exploring "how the TRIPS Agreement is influencing the Indian pharmaceutical industry and discuss[ing] the industry's growth

facturing generics, the Indian pharmaceutical industry developed considerable expertise and is now successfully cultivating a proprietary sector.[90]

The flexibilities that were available to India are much harder to find under the current regime. TRIPS now requires protection for all inventions (including pharmaceuticals),[91] and the PCT has made it easier for inventors to patent their advances throughout the world. To be sure, India managed to preserve some flexibility to continue manufacturing modern pharmaceuticals. It redefined what constitutes an "invention," deeming most new forms or new uses of known material to be unpatentable.[92] Its law was not challenged in the WTO (even though it was used to invalidate the patent on a lucrative treatment for leukemia), in part because TRIPS leaves definitions of its terms to national legislation.[93] But that latitude cannot be unlimited because if it were, countries could use clever definitions to avoid all their international obligations. Should a provision like India's be subject to a WTO dispute, the DSB may well count how many countries have similar measures and how many advances patented elsewhere would be unpatentable under the challenged provision. To pass muster, the types of advances left available for copying might be so few and so close to the line of uninventive that copying would not be profitable or provide significant training opportunities. A country seeking more space for fair following could also try limiting its

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factors in the post-TRIPS period within the [global value chain] framework"); Amy Kapczynski, *Harmonization and Its Discontents: A Case Study of TRIPS Implementation in India's Pharmaceutical Sector*, 97 CAL. L. REV. 1571 (2009) (broadly discussing the impact of TRIPS on India's pharmaceutical industry); Janice M. Mueller, *The Tiger Awakens: The Tumultuous Transformation of India's Patent System and the Rise of Indian Pharmaceutical Innovation*, 68 U. PITT. L. REV. 491 (2007) (providing the first major comparative analysis of India's new patents regime). *See also* Sampat & Amin, *supra* note 76 (describing the results of an empirical study on the implementation of India's post-TRIPS law).

90. *Innovating India's Pharmaceutical Industry*, WIPO, https://www.wipo.int/ipadvantage/en/details.jsp?id=2659 [https://perma.cc/66Q5-YWES] (last visited Apr. 2, 2023).

91. TRIPS, *supra* note 6, art. 27.1.

92. The Patents Act, No. 39 of 1970, § 3(d) (Universal 2005) (India).

93. *See* Novartis AG v. Union of India, (2013) 13 S.C.R. 148 (India) (establishing the importance of domestic legislation for defining the terms of TRIPS and thus limiting the scope of WTO adjudication).

approach to specific industries, but that strategy would likely be barred as discriminating by field of technology.

Even if a country were successful in a TRIPS challenge, there would be other problems. Success at expanding policy space may lead to new TRIPS-plus demands. For example, recent bilateral agreements focus directly on ensuring that other countries cannot adopt India's definition of invention.[94] Moreover, states that have investment obligations may be wary of enacting new limits on the ability of investors to obtain protection. Indeed, in one of the previously mentioned ISDS disputes, the pharmaceutical company Eli Lilly challenged a Canadian provision that raised the utility requirement and thus made it harder to acquire a patent. Lilly claimed that the modification undermined its expectations and was therefore unfair and inequitable.[95] Although Canada ultimately prevailed, it did so partly because Lilly could not prove that the Canadian law changed dramatically.[96] Presumably, a rapid change in the law could provoke a different result. Moreover, the litigation was extremely expensive: Canada laid out CDN $6 million and was reimbursed only 75 percent of that sum.[97] Not every country can afford to mount a similarly costly defense. Finally, even if a unique provision survives these challenges, there is a question whether examiners inundated with applications will have sufficient resources to implement it.

With the near-universal rejection of the best mode requirement in patent law, fair following is also harder to accomplish. Freed of that requirement, innovators can now rely on secrecy to prevent competitors from learning the most effective ways to manufacture their products. While a country could attempt to force the transfer of technologies kept as trade secrets, TRIPS requires protection for undisclosed information and—unlike for patent law—it does not include a provi-

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94. *See, e.g.*, KORUS, *supra* note 70, art. 18.8.1 (emphasizing that "each Party confirms that patents shall be available for any new uses or methods of using a known product").

95. *Eli Lilly*, *Final Award*, ¶ 46e.

96. *Id.* ¶¶ 349–50.

97. *Id.* ¶¶ 95, 43, 460; Dreyfuss & Frankel, *supra* note 68, at 393. *See also* Dreyfuss & Frankel, *supra* note 67, at 581 (discussing the chilling effect of ISDS).

sion allowing WTO members to make exceptions.[98] In addition, unilateral pressures and TRIPS-plus agreements have led many countries to increase trade secrecy protection.[99] Attempts to impose a stronger disclosure requirement would also risk ISDS challenges.

As to markets, a country could hope that if it is successful in defending fair following, other countries will adopt similar legislation and thus open their markets to the goods the fair-follower produces. However, that requires other countries to withstand pressures to increase protection. Since the TRIPS Agreement excludes parallel importation from the scope of dispute resolution, it may be possible to market in ways that take advantage of that provision.[100] However, TRIPS calls parallel importation "exhaustion," which the DSB may take to imply that importation is permissible only when the patent owner has exhausted its rights (for instance, by receiving compensation). Besides, subsequent TRIPS-plus agreements have already started to narrow this option.[101]

B. *Promoting Local Industry*

Developing countries have traditionally used a local working requirement to force patent holders to create jobs and opportunities that enable locals to develop both technological

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98. Indeed, the European Union has filed a complaint against China for forcing technology transfer, *China — Certain Measures on the Transfer of Technology*, WT/ DS549/6 (consultations requested, June 1, 2018), https://www.wto.org/english/tratop_e/dispu_e/cases_e/ds549_e.htm [https://perma.cc/DQJ6-895F]. However, the issue has not been resolved.

99. TRIPS, *supra* note 6, art. 39; *see also* Rochelle Cooper Dreyfuss, *The Rise (and Fall?) of Trade Secrecy Protection*, ALTI FORUM (June 15, 2022), https://alti.amsterdam/dreyfuss-trade-secret/ [https://perma.cc/A7GK-9NMM] (discussing reasons for the dramatic rise in secrecy protection in the last decade).

100. TRIPS, *supra* note 6, art. 6.

101. *See, e.g.*, The Australia–United States Free Trade Agreement, U.S.-Austl., art. 17.9.4, May 18, 2004, 43 I.L.M. 1248 (stating that "[e]ach Party shall provide that the exclusive right of the patent owner to prevent importation of a patented product, or a product that results from a patented process, without the consent of the patent owner shall not be limited by the sale or distribution of that product outside its territory, at least where the patentee has placed restrictions on importation by contract or other means."); Dreyfuss & Frankel, *supra* note 67, at 569 (nothing other attempts to limit parallel importation).

expertise and business acumen (to "learn by doing").[102] However, this strategy is also endangered. While, as noted above, a provision allowing states to require local working was incorporated into TRIPS through its reference to the Paris Convention, strong arguments have been made that other parts of TRIPS extinguish this flexibility.[103] As we saw, *Canada-Pharmaceuticals* put considerable emphasis on one of the nondiscrimination guarantees in the patent section (nondiscrimination by field of technology). That section also bars discrimination as to "whether products are imported or locally produced."[104] Since a local working requirement distinguishes by the locus of manufacturing, it would arguably violate that obligation. Nonworking might also be defended as a measure to prevent abuse. TRIPS permits such measures—but only if they are consistent with the rest of the Agreement.[105] Since adjudicators are inclined to cumulate TRIPS standards, they may also regard a local working requirement as inconsistent with the extensive conditions on permitting unauthorized use.[106]

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102. *See generally* Madhavi Sunder, *Intellectual Property in Experience*, 117 MICH. L. REV. 197, 205 (2018) (demonstrating that "fan activity, from discussion sites to live-action role-playing fosters learning, creativity, and sociability" and therefore arguing that merchandising rights in imaginative play through fair use should be limited).

103. Dreyfuss & Frankel, *supra* note 67, at 576–80; NUNO PIRES DE CARVALHO, THE TRIPS REGIME OF PATENT RIGHTS § 27.66 (2010).

104. TRIPS, *supra* note 6, art. 27.1.

105. *Id.*, art 8.1.

106. *See id.*, art. 31 (listing the provisions that shall be respected "[w]here the law of a Member allows for other use of the subject matter of a patent without the authorization of the right holder."). To be sure, the strategy has been used extensively. *See, e.g.*, Jorge L. Contreras, Rohini Lakshané, & Paxton Lewis, *Patent Working Requirements and Complex Products*, 7 NYU J. INTELL. PROP. & ENTERTAINMENT L. 1 (2017) (examining how the local working requirement has been deployed). However, use of the requirement has also been the subject of challenges in the WTO. Unfortunately, none has been resolved authoritatively, *see Notification of Mutually Agreed Solution*, *Brazil-Measures Affecting Patent Protection*, G/L/454 IP/D/23/Add.1 WT/DSB199/4 (July 19, 2001) (agreeing to drop a challenge to Brazil's working requirement upon Brazil's agreement to use the compulsory licensing approach to ensure local manufacture of AIDS drugs); *see also Award of the Arbitrators*, *Turkey - Certain Measures concerning the Production, Importation and Marketing of Pharmaceutical Products*, WT/DS583/ARB25 (July 25, 2022) (arbitral award concerning issues in a WTO Panel Report challenging Turkish localization and technology transfer requirements in the pharmaceutical sector).

C. *Adaptation*

As noted at the outset, modern technologies are often ill-suited to the needs of developing countries.[107] During the COVID-19 pandemic, the problem was storage, but myriad other conditions (climate, terrain, soil, electrification) can prevent countries in the South from easily using technological products in the same form as they are offered in the North.[108] Northern inventors could adapt their inventions to local needs, but it may not always be worth their effort to do so. Allowing inventors in the South to step in not only solves the last-mile problem, it also creates jobs and training opportunities that may be more enduring and educational than the strategies described above. But there are several problems. One is disclosure: the more that inventors are allowed to rely on trade secrecy, the less that adaptors can learn about the details of the inventions they wish to adapt.

Even with disclosure, adaptation will likely require experimentation. If the invention is locally patented, the adapter will need either the right holder's permission—which could easily be withheld—or legislation that exempts experiments from the scope of patent rights. As we saw, in *Canada-Pharmaceuticals*, the DSB approved a research exemption. However, it emphasized timing: the exception affected the de facto exclusivity available *after* patent expiration.[109] It would be harder to justify a research exemption with effects *during* the patent period. While the DSB might find the prevalence of research exceptions in many WTO members persuasive of TRIPS compatibility, those exceptions usually allow researchers to learn about the invention.[110] Adjudicators may be more skeptical of research aimed at altering the invention for local use. To defend

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107. *See supra* text at notes 11–15.

108. *See generally* K.R. Sanjiv, *The Case for Inclusive Innovation*, FORBES, (Mar. 20, 2020) https://www.forbes.com/sites/forbestechcouncil/2020/03/20/the-case-for-inclusive-innovation/?sh=B596f2854144 [https://perma.cc/72EC-U9A3] (discussing how innovations can be extended so that they can be used under differing conditions).

109. Canada-Pharmaceuticals Report, ¶¶ 7.57 & 7.61.

110. *See* WIPO Standing Committee on the Law of Patents, *Exceptions and Limitations to Patent Rights: Experimental Use and/or Scientific Research*, para. 3, WIPO/SCP/20/4 (2013) (providing "information on how exceptions and limitations relating to experimental use and/or scientific research have been implemented in Member States.").

such an exception, it may be necessary to ensure that the scope of the underlying patent is interpreted to cover the adaptation—that is, to ensure that the patentee is paid in cases where the adaptation cannibalizes the market for the original invention.

That approach will, however, mean that adaptation is likely to be expensive. Local innovators will be required to consider the cost of doing the research and paying royalties. Moreover, they will probably have to underwrite the expense of educating unsophisticated consumers, suppliers, and maintenance organizations about the benefits of the product and absorb customers' switching costs. To recoup these heavy investments, adapters will therefore likely need exclusive rights of their own. However, acquiring that protection may be difficult. Even if the underlying invention is not available locally, patented locally, or described in a local publication, it will be considered in the prior art under an absolute novelty standard. If the adaptation is incremental, it may well not be considered novel or inventive over that art. In other words, local inventors can be caught in a novelty trap created by art that is inaccessible or unusable locally.[111]

D. *Protection for Local Innovators*

Countries could create a lower-tier patent regime to protect this type of invention. For example, they could offer petit patents to incremental advances on a relative novelty standard. The Paris Convention envisions the adoption of utility model and industrial design regimes and TRIPS allows WTO members to offer more protection than the Agreement requires.[112] The availability of protection for adaptations may encourage the holders of the patents on original inventions to develop adaptations themselves. That would solve last-mile-type problems, but it would not advance the capabilities of local innovators. To ensure that it is local innovators who benefit

111. For a more detailed discussion of the novelty trap, see *Novelty Traps*, *supra* note 22, at 443–46 (explaining that, because of the novelty trap, "no country will award a utility patent to an invention that was disclosed in, or rendered obvious by, prior art available anywhere in the world.").

112. Paris Convention, *supra* note 25, art. 1; *see also* TRIPS, *supra* note 6, art. 1 (stating that "[m]embers may, but shall not be obliged to, implement in their law more extensive protection than is required by this Agreement.").

from the regime, a developing country may try to shelter them from crowding out by more technologically adept foreigners by making the new regime available only to domestic inventors.

Many developed countries once took an essentially similar approach by simply delaying patent awards to foreigners and by issuing them very narrow claims.[113] That type of informal differentiation would be harder for countries that defer to examiners in other countries, be it through the PCT, the PPH, or another mechanism. In addition, a formal system of lower-tier protection for locals could easily be challenged in the WTO as a violation of the guarantee of national treatment. The same protection could instead be offered to nationals of all developing countries, but such a measure could run afoul of the MFN obligation. Furthermore, in ISDS, differential treatment might be considered a denial of fair and equitable treatment, or a denial of a separate nondiscrimination guarantee. Thus, this strategy, like the others discussed, may be difficult to implement under the international intellectual property regime as it is currently understood.

IV. A Human Right to Participate in Science

As the COVID-19 pandemic demonstrated, when framed as a matter of access, the clash between intellectual property rights and human rights can have deleterious consequences. It limits the poor to advances that suit the well-heeled and makes the South dependent on the North. But the previous discussion shows that there is also a normative dimension: conceptualized this way, the question about access is perceived as distributive, a choice between awarding the gains from innovation to those who invented or to those who want access. In the absence of empirical evidence on how much is needed to incentivize innovation, it is easy to understand decisions to side with inventors. After all, without them, the innovations at issue may not have existed.[114] In contrast, conceiving of the right to

113. Elizabeth Webster, Paul H. Jensen & Alfons Palangkaraya, *Patent Examination Outcomes and the National Treatment Principle*, 45 Rand J. Econ. 449, 464 (2014); Kumar, *supra* note 24, at 214–15.

114. *But see* Daniel J. Hemel & Lisa Larrimore Ouellette, *Beyond the Patents-Prizes Debate*, 92 Tex. L. Rev. 303 (2013) (arguing that there are, of course, other incentives to invent such as negative incentives for failure to innovate);

scientific advancement as a right to *do* science makes it clear that users are not in it to get something for nothing (or on the cheap), but rather to become innovative in their own right; to satisfy their own technological needs and to make their own contributions to the world's knowledge base. Support for a right to do science also resonates with the North's growing concerns for its own technological resilience.[115] Furthermore, allowing states to build technological capacity would make the patent system more just: it would equalize the opportunity of every state to solve problems of global dimensions and to reap the monetary and reputational benefits from having done so.

Of course, this view can have an impact on the freedom to enact catch-up strategies only if a right to engage in the scientific enterprise is recognized, the interpretive approach to the TRIPS Agreement is revised, and the moves toward substantive convergence abate.

A. *The Right to Participate in Science*

A threshold question, then, is whether there is a human right to participate in science. Although the UDHR and related laws are generally seen as focusing on access interests, international law has been nibbling on the edges of a right to do science. Recent claims are of two types: a right to acquire the capacity to participate and a right to be recognized for participating.

In the human rights space, Farida Shaheed, the United Nations Special Rapporteur in the field of cultural rights, examined the interface between the rights of authors and inventors on the one hand, and the rights of the public on the other.[116] In her Report on patent law, she emphasized access rights, but put on an equal footing "opportunities for all to

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see generally Ian Ayers & Amy Kapczynski, *Innovation Sticks: The Limited Case for Penalizing Failures to Innovate*, 82 U. CHI. L. REV. 1781 (2015) (arguing that negative incentives for the failure to innovate can also stimulate innovation).

115. *See supra* text at note 18.

116. *See* Farida Shaheed (Special Rapporteur in the Field of Cultural Rights), *Rep. on the Copyright policy and the Right to Science and Culture*, U.N. Doc. A /HRC/28/57 (Dec. 24, 2014) ("emphasizing both the need for protection of authorship and expanding opportunities for participation in cultural life."); Farida Shaheed (Special Rapporteur in the Field of Cultural Rights), *Rep. on Cultural Rights*, U.N. Doc. A/70/279 (Aug. 4, 2015) [hereinafter Patents Report].

contribute to the scientific enterprise and freedom indispensable for scientific research."[117] The Report went on to recognize the dignitary interests associated with a right to participate in science and receive the benefits of science and the right to further develop technologies.[118] It also stressed the importance of reading flexibilities into international law that allow states to invest in science and enact rules that facilitate research and the adaptation of known technologies.[119] Shaheed further noted other developments, including the United Nations Declaration on the Rights of Indigenous Peoples, which recognizes rights to "develop [indigenous] intellectual property," and the efforts at WIPO to create a legal instrument to protect the contributions made by traditional knowledge.[120]

Several years later, the United Nations Committee on Economic Social and Cultural Rights followed up with a detailed study of the right to science as it is promulgated in the International Covenant on Economic, Social, and Cultural Rights.[121] The Report focused heavily on state obligations to ensure access to the benefits of science, prevent discrimination regarding education and research opportunities, support research aimed at the needs of the disadvantaged, and protect freedoms of inquiry and expression. However, it also argued that there can be no "rigid distinction between the scientist who produces science and the general population, entitled only to the benefits derived from [the scientists'] research."[122] Thus it maintained that the right to participate in culture must include the right to take part in decisions regarding science and,

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117. Patents Report, *supra* note 116, para 12.

118. *Id.*, paras. 26, 75 & 110 (discussing the problems of blocking research, the development of products, the enactment of public interest legislation, and the goals of ensuring research independence, freedom to publish, and meeting survival needs).

119. *Id.*, paras. 63–72 (explaining several flexibilities to patents that states can use when implementing multilateral treaties, especially when implementing the TRIPS Agreement).

120. *Id.*, para. 36 (citing G.A. Res. 295, U.N. GAOR, 61st Sess., Supp. No. 49, vol. I, annex I, art. 31, para. 1 & 45, U.N. Doc. A/61/295, The United Nations Declaration on the Rights of Indigenous Peoples (2007)).

121. ICESCR, art. 15; *see generally* ICESCR Report, *supra* note 16 (explaining the relationship between science and economic, social and cultural rights embodied in article 15 (1) (b), (2), (3) and (4) of the ICESCR).

122. ICESCR Report, *supra* note 16, para 9.

by extension, the right to "develop . . . the critical mind and faculties associated with doing science."[123] It therefore concluded that states have a duty to create an "enabling and participatory environment" through, among other things, financial support, fostering the "positive effects" of intellectual property on scientific progress, and international technical cooperation.[124] Like Shaheed's study, the Committee also stressed the importance of recognizing the intellectual contributions of indigenous people.[125] Along similar lines, the United Nations' Draft Resolution on Population and Sustainable Development emphasized "technology transfer and capacity-building for adaptation so as to respond to the needs of developing countries."[126]

There are analogous moves within the international intellectual property realm. The UDHR's recognition of rights to "participate in the cultural life" and to an education have obvious implications for copyright.[127] Thus, Lea Shaver has suggested that these rights impose a duty on governments to provide access to the copyrighted reading material needed to educate and build the capacity to participate.[128] Similarly, Margaret Chon has argued that the intellectual property regime must include a substantive equality principle. In her view, this creates an imperative to allow the use of protected materials in ways that promote the flourishing of human capacity and

123. *Id.*, para. 10.

124. *Id.*, paras. 46, 62, & 77–79.

125. *See id.*, paras. 39–40 (stating that "[s]tates must take measures to protect [traditional and indigenous peoples'] knowledge through different means, including special intellectual property regimes").

126. Comm. on Population and Development, Draft Resolution on Population and Sustainable Development, in Particular Sustained and Inclusive Economic Growth, art. 24, U.N. Doc. E/CN.9/2022/7 (May 13, 2022).

127. UDHR, arts. 27(1), 26. *See generally* Peter K. Yu, *Intellectual Property and Human Rights 2.0*, 53 U. RICH. L. REV. 1375 (2019) (identifying "the contributions a robust discourse on intellectual property and human rights can make to the future development of the intellectual property regime, the human rights regime and the interface between these two regimes"); *see also* Sharon E. Foster, *Prelude to Compatibility Between Human Rights and Intellectual Property*, 9 CHI. J. INT'L L. 171 (2008) (pointing out the potential conflict between copyright and the right to education right to participate in cultural life).

128. Lea Shaver, *The Right to Read*, 54 COLUM. J. TRANSNAT'L L. 1, 6 (2015).

respect for dignitary interests.[129] Significantly, increased recognition of the human rights to read, learn, and participate in culture led to the adoption of the Marrakesh VIP Treaty on Access for the Visually Impaired in 2016.[130] In WIPO's words, that agreement provides persons with print disabilities "opportunities for professional growth, allowing them to contribute to their local economies and become economically self-sufficient."[131] With the advent of digital technologies, there is also a growing literature on establishing international recognition of a right to conduct online research.[132]

On the technology front, the international community has not usually denominated participation claims as sounding in human rights. Nonetheless, it has recognized the concerns identified by Shaheed. At WIPO, a Development Agenda includes recommendations addressed to technology transfer, flexibilities, and public policy.[133] There are also ongoing negotiations for an agreement to protect traditional knowledge.[134] For its part, the WTO issued two Declarations in the wake of *Canada-Pharmaceuticals*—a Ministerial Declaration and a Declaration on the TRIPS Agreement and Public Health ("the Doha

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129. Margaret Chon, *Intellectual Property and the Development Divide*, 27 CARDOZO L. REV. 2821, 2909–10 (2006).

130. Marrakesh Treaty to Facilitate Access to Published Works for Persons Who Are Blind, Visually Impaired, or Otherwise Print Disabled, June 27, 2013, 2013 U.S.T. Lexis 89 (entered into force Sept. 30, 2016). *See generally* Laurence R. Helfer, Molly K. Land & Ruth L. Okediji, *Copyright Exceptions Across Borders: Implementing the Marrakesh Treaty*, 42 EUR. INTELL. PROP'Y REV. 332 (2020) (explaining the background and general objectives of the Marrakesh agreement).

131. WIPO, MAIN PROVISIONS AND BENEFITS OF THE MARRAKESH TREATY, (2013) at 6. *See also* Lida Ayoubi, *Deciphering the "Right to Read" Under International Human Rights Law: A Normative Framework for Equal Access*, 36 WIS. INT'L L.J. 425 (2019) (generally discussing how the Marrakesh treaty recognizes and promotes certain human rights of visually impaired people).

132. *See, e.g.*, Sean Flynn, Michael Palmedo, & Andrés Izquierdo, *Research Exceptions in Comparative Copyright Law*, (2021) PIJIP/TLS RESEARCH PAPER SERIES NO. 72. https://digitalcommons.wcl.american.edu/research/72 [https://perma.cc/UD4H-Z22A] (categorizing the copyright laws of different countries according to the degree to which they provide exceptions to copyright exclusivity for research uses).

133. WORLD INTELL. PROP. ORG., THE 45 ADOPTED RECOMMENDATIONS UNDER THE WIPO DEVELOPMENT AGENDA (2007), https://www.wipo.int/ip–development/en/agenda/recommendations.html [https://perma.cc/23LY-H58Y].

134. *See* note 17, *supra*.

Declaration").[135] With respect to patents, both were primarily concerned with ensuring access to medicines, but they had a dynamic focus as well. The Ministerial Declaration emphasized the importance of research and development. It also acknowledged the obligation to protect traditional knowledge.[136] The Doha Declaration recognized the problems posed by the lack of technological and manufacturing capacity and reaffirmed a commitment to technology transfer.[137] After these Declarations, the WTO amended TRIPS so that, among other things, developing countries could collaborate in establishing their own manufacturing facilities.[138] Moreover, a waiver of TRIPS was eventually adopted, thereby implicitly recognizing the capacity of countries to manufacture COVID-19 vaccines.[139]

National laws have followed a similar path. US commentators have located a right to engage in scientific collaboration within the First Amendment.[140] The First Amendment has also been used to support the exclusion of the building blocks of science from the scope of patent protection.[141] Many jurisdictions are also considering a right to repair, which would ensure that consumers can experiment and alter products for their own needs.[142] Some of these measures also mandate disclosure of material, such as software, diagnostics, and repair manuals, that might otherwise be kept as trade secrets.[143] As in

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135. Ministerial Declaration, WT/MIN(01)/DEC/1 (Nov. 20, 2001) [hereinafter *Ministerial Declaration*]; WTO, Declaration on the TRIPS Agreement and Public Health, WTO Doc. WT/MIN(01)/DEC/2 (Nov. 20, 2001) [hereinafter *Doha Declaration*].

136. Ministerial Declaration, *supra* note 135, ¶¶ 17 & 19.

137. Doha Declaration, *supra* note 135, ¶¶ 6 & 7.

138. TRIPS, *supra* note 6, art. 31bis.

139. *See supra* text at notes 12–15.

140. U.S. CONST., amend. I; *see also* Diane Leenheer Zimmerman, *Scientific Speech in the 1990s*, 2 N.Y.U. ENVTL. L.J. 254 (1993) (exploring the implications of the First Amendment for doing science).

141. *See* Sapna Kumar, *Life, Liberty, and the Pursuit of Genetic Information*, 65 ALA. L. REV. 625, 634–35 (2014) (discussing, among other things, Ass'n for Molecular Pathology v. Myriad Genetics, Inc., 569 U.S. 576 (2013), which began with a First Amendment argument, but was decided on patent law grounds); HELFER & AUSTIN, *supra* note 1, at 312–315.

142. Leah Chan Grinvald & Ofer Tur-Sinai, *Intellectual Property Law and the Right to Repair*, 88 FORDHAM L. REV. 63 (2019).

143. *See, e.g.*, S. S410A/A7006-B, the Digital Fair Repair Act (N.Y. 2022). *Cf.* Michael A. Carrier, The Right to Repair, Competition, and Intellectual Property, 15 LANDSLIDE (Jan. 11, 2023) https://www.americanbar.org/

the international sphere, there is also increasing interest in interpreting domestic laws to allow data mining research.[144]

Although not always articulated as a right to do science, the exclusions and defenses found in national intellectual property laws implicitly recognize the right to learn, tinker, conduct research, and build compatible products.[145] Graeme Dinwoodie and I have suggested that these principles constitute an international acquis that furnishes a public-regarding counterweight to the proprietary focus of the TRIPS Agreement;[146] they can equally well be understood as supporting a human right to participate in intellectual production.

B. *The Impact on International Intellectual Property Law*

If human rights were understood to include a right to participate in science, the impact on the interpretation and development of domestic and international law would be significant. It would both encourage and empower states to adopt the catch-up strategies discussed above.

1. *Interpreting TRIPS Commitments*

To be sure, understanding human rights to include a right to do science would increase TRIPS flexibilities only if the DSB were also to shift its approach to interpretation. But here, too, the Declarations issued after *Canada-Pharmaceuticals* should make a difference. In stressing that the TRIPS must be read "in a manner supportive of public health,"[147] the Ministerial Declaration intimated that the DSB must reconsider how it construes the Agreement. The Doha Declaration supplied fur-

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groups/intellectual_property_law/publications/landslide/2022-23/december-january/right-repair-competition-intellectual-property/ [https://perma.cc/2L78-SR54] (exploring the right to repair under antitrust law and its relationship to intellectual property protection).

144. Sean M. Fiil-Flynn et al., *Legal Reform to Enhance Global Text and Data Mining Research*, 378 SCIENCE 951 (Dec. 1, 2022).

145. *See, e.g.*, Directive 2009/24/EC of the European Parliament and of the Council of 23 April 2009 on the legal protection of computer programs, OJ L111/16, 23.4. 2009, Recital 16 and Article 6 (nulling and voiding contractual provisions contrary to the provisions the Directive "with regard to the making of a back-up copy or to observation, study or testing of the functioning of a program").

146. DINWOODIE & DREYFUSS, *supra* note 38, at 175–203.

147. Ministerial Declaration, *supra* note 135, ¶ 17.

ther details. It acknowledged the importance of the objectives and principles articulated in TRIPS to interpreting the Agreement's obligations;[148] recognized that there are WTO members with unique concerns; reaffirmed a commitment to technology transfer; and emphasized various flexibilities, including the right of each member to self-determination on issues such as when compulsory licenses should be granted, what constitutes an emergency, and the contours of rules on exhaustion.[149] While the status of the Doha Declaration under international law remains unclear,[150] the DSB has cited it. In *Australia-Plain Packaging*, the objectives and principles of TRIPS were used to approve restrictions on how trademarks are displayed on tobacco products.[151]

The Ministerial and Doha Declarations were motivated by health concerns. However, their qualitative focus and emphasis on using TRIPS' principles and objectives to guide interpretation should make strategies to enable participation in science easier to defend. Thus, it seems clear that under the Doha Declaration, the three steps in the Exceptions tests must be viewed holistically to ensure that, in the patent context, the interests of third parties are fully taken into account. If they were, then the ability of a nation's citizens to learn, train, conduct research, and reach a place where they can further the needs of their own people would be balanced against the proprietary interest of patent holders to control all uses of their innovations. To the extent that patent holders fail to respond to a country's technological challenges or do not supply adequate amounts of critical materials, the right to adopt strate-

148. Doha Declaration, *supra* note 135, ¶ 5(a).

149. *Id.*, ¶¶ 1, 7, 5(b), (c), and (d).

150. Appellate Body Reports, *Australia – Certain Measures Concerning Trademarks, Geographical Indications and Other Plain Packaging Requirements Applicable to Tobacco Products and Packaging*, WT/DS435/AB/R, WT/DS441/AB/R (June 9, 2020), para. 6.626 (stating only that the Doha Declaration "'bears specifically' on the interpretation of each provision of the TRIPS Agreement.").

151. *Id.* To be sure, both the panel and the Appellate Body closely scrutinized the evidence on whether the restrictions would reduce the use of tobacco, *id.* at paras. 6.41–6.373; Panel Reports, *Australia – Certain Measures Concerning Trademarks, Geographical Indications and Other Plain Packaging Requirements Applicable to Tobacco Products and Packaging*, WT/DS435/R, WT/DS441/R, WT/DS458/R, WT/DS467/R (June 28, 2018) paras. 7.516 & 7.518–7.904.

gies that promote self-reliance would appear compelling, or at least not an "unreasonable" intrusion on the "legitimate" interests of right holders.

By the same token, were the DSB to stop counting things and begin to consider the impact of exceptions and limitations qualitatively and in light of the goals of improving social welfare and promoting technological development, it would likely approve a state's definition of invention that expands opportunities for fair following—even if it leaves a measurable set of advances patented in the North locally unprotectable.[152] Similarly, the Doha Declaration's reference to exhaustion suggests that a scheme intended to expand markets is also acceptable. Moreover, doubts about the survival of the Paris Convention's provision on local working should disappear once its strategic importance in furthering a human right to acquire technological capacity is taken into account.[153]

More generally, the recognition of a right to do science would bring into focus the DSB's problematic approach to discrimination. As Dinwoodie and I have argued, the hard line that the DSB currently takes to the antidiscrimination provisions in the patent section of TRIPS is unwarranted.[154] Turning these guarantees into cornerstone requirements that apply to all other provisions in that section is incompatible with the overall structure of the Agreement, which articulates generally-applicable requirements at the outset. Overenthusiastic application of these provisions can also prevent states from targeting "sectors of vital importance . . . to technological development." Since that practice is specifically listed in the TRIPS principles,[155] impediments should not be layered on top of the Exceptions tests or imposed on top of the nonworking rule incorporated through the Paris Convention. Thus, measures designed to take advantage of existing capacities and local re-

152. Even the *US-110(5)* panel realized that counting things is problematic: it noted that counting exceptions in existing laws would unjustifiably freeze the law, *see* US-110(5) Report, ¶ 6.59 (declining to accept the European Communities' view "that the coverage was 'frozen' in 1967.").

153. Again, the United States' CHIPS and Science Act is suggestive of the importance every country attaches to local production of important technologies. Fact Sheet, *supra* note 18.

154. Dinwoodie & Dreyfuss, *supra* note 38, at 99–109.

155. TRIPS, *supra* note 6, art. 8.

sources relevant to particular sectors ought to be considered valid approaches to improving technological capacity.

Admittedly, the national treatment and MFN obligations are somewhat different in that they are cornerstones: "fundamental principle[s] of the world trading system."[156] Thus, the DSB has equated the national treatment provision in TRIPS to Article III:4 of the GATT and claimed that the jurisprudence under that Article demands strict scrutiny of intellectual property measures that discriminate by nationality.[157] Lost in this analysis is an important limit on the GATT guarantee: it only requires equivalent treatment of "like" products.[158] By its terms, TRIPS applies to all nationals. However, as the United Nations Conference on Trade and Development (UNCTAD) put it during the failed negotiations over SPLT, "[E]quality of treatment only makes sense when the parties involved are in a general way equal; when they are not, equality of treatment simply gives the stronger party unlimited freedom to utilize his power at the expense of the weaker party."[159] In claiming a right to develop scientific capabilities, a country would provide the DSB with an opportunity to consider whether lingering differences in technological capacity should be taken into account in TRIPS jurisprudence. Were it to relax its approach, measures that enable catching up should pass muster, even if they are extended only to local inventors (or only to inventors from countries that are behind the technological frontier).

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156. Havana Club Report, para. 233.

157. *See id.*, para. 242 (stating that "the jurisprudence on Article III:4 of the GATT 1994 may be useful in interpreting the national treatment obligation in the TRIPS Agreement").

158. GATT art. III:4 ("The products of the territory of any contracting party imported into the territory of any other contracting party shall be accorded treatment no less favourable than that accorded to *like products* of national origin in respect of all laws, regulations and requirements affecting their internal sale, offering for sale, purchase, transportation.") (emphasis added). Indeed, considerable ink has been spilled on questions of likeness, *see* SIMON KLOPSCHINSKI, CHRISTOPHER S. GIBSON & HENNING GROSSE RUSE-KHAN, THE PROTECTION OF INTELLECTUAL PROPERTY RIGHTS UNDER INTERNATIONAL INVESTMENT LAW 204 (2021) (analyzing the standards of treatment and protection enshrined in international investment agreements for IP rights).

159. Joint report of the UNDESA, UNCTAD Secretarial, and WIPO Int'l Bureau, The Role of the Patent System in the Transfer of Technology to Developing Countries, TD/B/AC.11/19/Rev.1, at 47 (1975).

The DSB should be even less concerned about a violation of the MFN provision. As with national treatment, the GATT provision is limited to like products.[160] And as Dinwoodie and I have noted, prior to TRIPS this guarantee was not a part of international intellectual property law; it was considered inappropriate in that context because differences in treatment are inevitable when there are disparities among national infrastructures supporting innovation.[161] Thus, we suggested that the DSB limit its scrutiny to examining the reasons for differences in treatment and the fit between the measure and its justification.[162] A justification for differential treatment that is grounded in technological inequality and that is intended to equalize the capacity to do science ought, under that approach, to be considered TRIPS-compatible.

2. *Other International Commitments*

Surviving a TRIPS challenge would not be enough to defend the strategies developing countries use to catch up to the technology frontier. As noted earlier, TRIPS-plus agreements introduce new requirements and IIAs add new guarantees. Recognizing a human right to participate in the scientific enterprise would, however, have an impact here as well. In a comparative study of the success of TRIPS-plus efforts in Latin America, César Rodríguez-Garavito and I, with the help of national collaborators, found that well-articulated norms grounded in a human rights narrative can successfully block the adoption of new commitments to patent protection or can soften the ways in which such commitments are implemented locally.[163] The Latin American study focused on the right to

160. GATT, art. I:1 ("any advantage, favour, privilege or immunity granted by any contracting party to any product originating in or destined for any other country shall be accorded immediately and unconditionally to the like product originating in or destined for the territories of all other contracting parties.").

161. DINWOODIE & DREYFUSS, *supra* note 38, at 103–104.

162. *Id.*, at 104.

163. *See* Rochelle Cooper Dreyfuss & César Rodríguez-Garavito, *Conclusion: Balancing Wealth and Health in a Transnational Regulatory Framework*, *in* BALANCING WEALTH AND HEALTH: THE BATTLE OVER INTELLECTUAL PROPERTY AND ACCESS TO MEDICINES IN LATIN AMERICA 323, 335–338 (Rochelle C. Dreyfuss & César Rodríguez-Garavito, eds., OUP 2014) (finding that "outside the context of binding regional intellectual property law, constitutive values and international norms (such as human rights and *ius cogens*)

health; a narrative centered on self-sufficiency and a wish to contribute to the world's knowledge base could be equally, if not more, powerful. It is better targeted at patent obligations than the right to health, which the study showed was sometimes used to support demands for more doctors and hospitals rather than access to medicine.[164] As important, a right to do science replaces the something-for-nothing framing with a conceptualization that has the potential to benefit everyone. Developing capacity in the South would also make the international patent system more just. It would give inventors all over the world the opportunity to be the first to invent needed advances and provide them with compensation and recognition for having done so.

Recognizing a human right to do science might also address other frustrations voiced by the South. It could lead to greater appreciation for technological achievements accomplished through methodologies different from those used in the North: through long-term and careful observation and incremental development by groups, rather than by identifiable individuals in technical leaps sufficient to constitute an inventive step. Recognition of a right to participate in science might therefore expedite the adoption of the long-negotiated convention on traditional knowledge and bring an end to the perception that the present regime favors the North at the expense of the South.[165] Recognizing that others do science might also promote more collaboration among inventors in

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provide the legal hooks for effective contestation [against new commitments to patent protection]"); *see also* Molly Land, *Human Rights Frames in IP Contests*, *id.*, 276–286 (finding that "intellectual property contestations were framed more frequently in terms of consumer's rights, dignity, free competition, the environment, and the rights of the poor"). *See also* Laurence R. Helfer & Karen J .Alter, *The Influence of the Andean Intellectual Property Regime on Access to Medicines in Latin America*, *id.*, 247 (noting other supranational norms that influence the national implementation of international intellectual property obligations).

164. Dreyfuss & Rodríguez-Garavito, *supra* note 162, at 330.

165. *See* Samuel Lim, *An Equitable Approach to Traditional Knowledge Protection*, 53 N.Y.U. J. INT'L L. & POL. 135, 141 (2020) (explaining how the existing regime promotes inequity among multinational corporations and indigenous peoples in developing countries); *see also* Susy Frankel, *"Ka Mate Ka Mate" and the Protection of Traditional Knowledge*, *in* INTELLECTUAL PROPERTY AT THE EDGE 193, 213–14 (Rochelle Cooper Dreyfuss & Jane C. Ginsburg, eds., 2013) (discussing the existing legal and normative foundation for recognition of traditional knowledge).

the North and South.[166] Furthermore, it would lend support to the Inclusive Innovation Movement, which fosters relationships among differently-credentialed innovators in the name of expanding the storehouse of scientific knowledge.[167]

As to IIAs, deemphasizing the "something for nothing" view should reduce the probability that ISDS tribunals will see measures that promote technological capacity as expropriations. Once again, the right to health is illustrative of the potential impact. In one dispute, an ISDS tribunal held that measures aimed at protecting public health are an exercise of police powers and can therefore never constitute an expropriation.[168] Furthermore, recent IIAs have specifically excluded measures taken to further public health from the scope of the guarantee against expropriation—or even from the scope of ISDS.[169] Again, a right to do science is significantly different from a right to health. However, eliminating technological dependency is surely a public interest concern of the highest order. Similarly, measures justified as efforts to equalize technological capacity should be considered fair and equitable. Or put another way, if technological self-sufficiency were considered a human right, investors could not claim a legitimate interest in preventing states from enhancing capacity to engage in the scientific enterprise.

3. *Procedural Spillover*

The cost of maintaining a patent office and, in particular, the need to devote local technological expertise to examination, means that developing countries will continue to be motivated by efficiency concerns. They will remain tempted to adopt international norms, defer to foreign examiners, join re-

166. *Cf.* Amy Kapczynski, *Order Without Intellectual Property Law: Open Science in Influenza*, 102 CORNELL L. REV. 1539, 1580–84 (2017) (noting the difficulties in contributing to collaborative work on developing influenza vaccines).

167. INCLUSIVE INNOVATION, https://inclusiveinnovation.org/ [https://perma.cc/35EV-Q3Q4] (last visited Mar. 20, 2023); MITD-LAB: Designing for a More Equitable World, https://d-lab.mit.edu/about [https://perma.cc/EQ3K-S6QC]; *see also* Richard Heeks, Christopher Foster & Yanuar Nugroho, *New Models of Inclusive Innovation for Development*, 4 J. INNOVATION & DEV. 175 (2014) (discussing inclusive innovation as a policy lever for development).

168. *Philip Morris v. Uruguay*, ¶ 287.

169. Dreyfuss, *supra* note 65, at 252–57.

gional agreements, or base protection on foreign law.[170] However, they may feel differently once the slide to convergence is recognized as undermining the effort to protect the fundamental right to participate in science. Significantly, several countries in the European Union are currently resisting the region's attempt to adopt a unitary patent regime, despite the efficiency gains it presents. In part, their objections may be grounded in public-regarding considerations that they see as trumping efficiency objectives.[171]

There are also solutions to efficiency challenges that preserve national policy space. For example, many countries include opposition procedures in their patent regimes. These give challengers a period of time to demand that a patent office reconsider its patentability determination.[172] They are effective at conserving examiner resources because opposition is attractive mainly when the challenged advance is socially important and would be unpatentable by reason of a unique feature of the local law—one that a foreign examiner may not have considered. Once again, the right to health furnishes an example of how this approach works. As discussed earlier, India has a special definition of "invention" that denies protection to certain types of incremental improvements. Health activists such as I-MAK use oppositions to ensure that India's unique definition is applied when important pharmaceuticals

170. Significantly, none of the countries that have signed validation agreements with the EPO—Morocco, Moldova, Tunisia and Cambodia—are technologically developed.

171. *See, e.g.*, Kluwar Patent Blog, *Despite the Defeat at the CJEU, Spain Will Not Join the Unitary Patent System* (June 17, 2015), http://patentblog.kluweriplaw.com/2015/06/17/despite-the-defeat-at-the-cjeu-spain-will-not-join-the-unitary-patent-system/ (describing Spain's concern that the decision not to translate Unitary Patents into Spanish will make the information less available to local inventors). *See also* Dimitris Xenos, *The European Unified Patent Court: Assessment and Implications of the Federalisation of the Patent System in Europe*, 10 SCRIPTED 246, 253–56 (2013) (describing the loss of national sovereign authority to adjust policies in light of local needs).

172. *See, e.g.*, 35 U.S.C. §§ 321–29 (describing the procedure for filling a post-grant review); EPC, arts. 99–101 (describing the procedure for filling a notice of opposition to a patent).

are examined.[173] At one point, Brazil's national health agency, ANVISA, performed a somewhat similar function.[174]

The South could also take a page out of the North's playbook: Amy Kapczynski has suggested ways that developing countries should cooperate with one another.[175] They could develop common patentability standards better attuned to their own needs, such as a relative novelty standard, a best mode requirement, or a lower tier of protection. Similarly, they could train examiners in their own patent offices and implement their own versions of the PCT, PPH, and IP5. As Caroline Ncube has described, countries on the African continent are already considering a pan-African agreement that is more closely tailored to local interests than the patent laws they enacted in the immediate aftermath of the TRIPS Agreement.[176]

V. CONCLUSION

The human right to "share in scientific advancement," has been understood as a right of access to the scientific achievements of others. This framing plays an important role in supporting exceptions and limitations to proprietary rights that increase the distribution of critical resources. Moreover, it encourages philanthropy and other efforts to supply technological advances to the poor. However, the focus on access also has several rather dubious consequences. It leads to technological dependency without any assurance that the poor will receive adequate supplies of critical technologies. It also leaves in place an innovation agenda that is dominated by the wishes of the better off. A view that includes the right to participate in science creates a more compelling narrative. Instead of de-

173. *See* Kapczynski, *supra* note 89, at 1599 (stating that grounds for pregrant opposition include "the contention that the invention does not meet the statutory requirements for novelty and inventive step"); I-MAK, https://www.i-mak.org/ [https://perma.cc/4VLF-M2MY]; *see also* Sampat & Amin, *supra* note 76, at 752 (describing how HIV/AIDS patent applications were rejected through "opposition" procedures started by third parties).

174. *See also* Giovanna Chinait, *Brazilian Pharmaceutical Patents: The End of ANVISA's Controversial Prior Consent*, 53 BOSTON INTELL. PROP. LAW ASSOC. NEWSL. (2022) (describing the negative effects caused by ANVISA's ability to issue patentability and formal findings during the examination process of patent applications).

175. Kapczynski, *supra* note 89, at 1639–1642.

176. Ncube, *supra* note 78, at 425–428.

manding something for nothing, it suggests that in exchange for greater policy space, everyone will enjoy more diverse sources of creative production and that opportunities to invent will be available to all.

There are aspects of international and national law that accept how critical participation in science and culture is to human flourishing; that understand the imperative to develop capacities to solve technological problems, adapt foreign solutions, and assure adequate supplies; and that appreciate alternative methods of contributing to the world's knowledge base. Recognizing a human right to do science would unite these diverse elements into a coherent account. It would force the WTO to rethink its crabbed interpretation of the TRIPS Agreement, lead the North to reconsider its demands for ever-stronger protection, and draw needed attention to the impact of procedural developments on substantive law. In the aftermath of the pandemic, developed countries have engaged in efforts to ensure their own technological self-sufficiency in critical sectors. International obligations should be understood to permit developing countries to adopt catch-up strategies that would allow them to do the same.