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International Law and Digitalisation

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Chapter 35: International Law and Digitalisation

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Abstract

Digitalisation has wrought fundamental change in the stuff of international law since the end of the Cold War: the objects towards which it is oriented; the subjects by and for which it is understood to be made; the matters with which it is concerned; the materials, rhythms, politics, protagonists and modalities of its operation. These changes have been entangled with others and have helped to fuel and shape many of them. The claim is not that digitalisation has made international law stronger or weaker across the board or that it has overridden all prior or alternative logics of the discipline. Rather, this chapter contends that digitalisation has enlivened multiple tonalities within the discipline of international law and ramified a range of conflicts within it. This chapter will first explain what is meant by digitalisation and reflect briefly on the conundrum of ‘Cold War’ periodisation before turning to various sub-domains into which international lawyers have traditionally subdivided their field to survey the ingression of the digital in each. This sequence begins with the digitalisation of the global economy and its international legal infrastructure. It continues with the digitalisation of war as practised and comprehended by international lawyers and concludes with the digitalisation of global politics as imagined and conducted in the international legal field. A final section will reflect on the significance of this ingression for post-Cold War hubris, New Cold War entrenchment, and allegiances and struggles that surpass both.

Keywords: International law, digital technology, history of international law, digital economy, digital warfare, digital politics

Introduction

Imagine if, by some fanciful realisation of global consensus, all existing and emergent actors on the international plane—all those exercising any arguable or established international legal status, power or authority—agreed to record, analyse, exchange and communicate all data that they assembled, disseminated and interpreted *musically*, rather than in words, images, numbers, datasets, or other non-musical symbols and formats. Henceforth, ‘translation’ would consist primarily of generating musical renditions of non-musical data and vice versa. Sonic renderings and aural experiences of the international would take priority over or become ubiquitous components of others. Those who possessed musicality (could sing, play, interpret and compose music well), who owned recording, amplification or other music-making equipment or who controlled access to performance spaces would become key mediators of all kinds of global interactions; those who could not or did not would be less so. All other modes of representation and perception of and on the international plane would

be answerable in varying degrees to ‘musicalisation’ and all would struggle to make themselves heard in musical registers.

To say that international law became ‘digitalised’ after the end of the Cold War—as the title of this chapter suggests—is to allude to a transformation more-or-less on the scale of the thought experiment above. This is not just a matter of altering how pre-existing international legal agents and norms are mediated, although it does entail such alteration. Certainly ‘digitalisation’—the practice of rendering data in series of discrete values (typically ones and zeros) and thereby enabling enhanced computational possibilities—has altered how international legal materials, norms and ideas get represented, stored, negotiated, analysed and shared. Nonetheless, the transformations that this chapter will outline surpass the reach of communicative or informational change. Much as the musical remaking of the world would do, digitalisation has wrought fundamental change in the stuff of international law: the objects towards which it is oriented; the subjects by and for which it is understood to be made; the matters with which it is concerned; the materials, rhythms, politics, protagonists and modalities of its operation. These changes have been entangled with others described in this volume and have helped to fuel and shape many of them. The claim is not that digitalisation has made international law stronger or weaker across the board or that it has overridden all prior or alternative logics of the discipline; that kind of argument was derided by Jack Goldsmith in the late 1990s as symptomatic of the perils of ‘focusing exclusively on what is new about the [Internet] and overlooking what is old about it’.¹ Rather, this chapter contends that digitalisation has enlivened multiple tonalities within the discipline of international law and ramified a range of conflicts within it.

The argument that international law has become digitalised during the period under this volume’s scrutiny warrants unpicking from the outset. This chapter will first explain what is meant by digitalisation in this context. The chapter will turn, then, to various sub-domains into which

¹ J. Goldsmith, ‘Regulation of the Internet: Three Persistent Fallacies Symposium on the Internet and Legal Theory’ (1997) 73 *Chicago-Kent Law Review* 1119–32 at 1131.

international lawyers have traditionally subdivided their field (contested and contestable divisions, yet nonetheless persistent) to survey the ingression of the digital in each, adopting a high-level survey approach rather than any expert historiographical method. This sequence begins with the digitalisation of the global economy and its international legal infrastructure. It continues with the digitalisation of war as practised and comprehended by international lawyers and concludes with the digitalisation of global politics as imagined and conducted in the international legal field. A final section will reflect on the significance of this ingression for post-Cold War hubris, New Cold War entrenchment and possibilities, experiences, allegiances and struggles that surpass both.

Before so proceeding, however, it is worthwhile dwelling briefly on the conundrum of ‘Cold War’ periodisation: a historical marker that seems as much symptomatic as descriptive of the experiences and sensibilities that it is supposed to call to mind. What could be more exemplary of Cold War aesthetics than the practice of carving out a slab of ostensibly global time, between 1945 and 1989, dubbing it ‘the Cold War’ in the singular, and analysing later periods in derivative terms? What could be more indicative of archetypal Cold War hubris (or anxiety) than insistence that all people, everywhere were, during this period, caught up in ‘an East-West antagonism rooted in irreconcilable ideologies, structured on geographical partition and strategic deterrence’ the ramifications of which persist to this day?² Any study of the Cold War’s aftermaths betrays the tendentious hold of this hermeneutic, occlusions notwithstanding.³ For purposes of writing about digitalisation, however, the very partiality of this framing may be valuable insofar as it gives some pause to ‘the avant-gardism pervasive across recent theorizations of the powers of data’ and the sense of inevitability to which that often gives rise.⁴ For this reason, and to serve as a kind of radio link between different contributions to this volume, the Cold War will be a recurrent point of reference in this chapter.

² Federico Romero, ‘Cold War Historiography at the Crossroads’ (2014) 14:4 *Cold War History* 685–703 at 689.

³ On the ‘limited’ explanatory power of the Cold War to aid understanding of how ‘a multitude of regional modernities unfolded’, see Prasenjit Duara, ‘The Cold War as a Historical Period: An Interpretive Essay’ (2011) 6:3 *Journal of Global History* 457–480 at 457–8.

⁴ Colin Koopman, *How We Became Our Data: A Genealogy of the Informational Person* (Chicago: University of Chicago Press 2019) at 169.

Digitalisation explained

Digitalisation, as the term is used in this chapter, encompasses multiple senses of ‘making digital’ with reference to digital computation, digital media and digital technology. It has material dimensions; it implies growing reliance on computing and electronics involving the representation of data in discrete values comprised of binary elements and on associated infrastructures. Yet it also implies the pervasion through all aspects of international legal work of digital logic. International legally significant institutions and practices are increasingly informed by digital ordering, relations and sense-making. This is not to say that the international legal field has become reducible to discrete entities and associated axioms, or that international law’s umbilical tie to notions and ideals of ‘reason’ has been superseded by informational and electrical connections. This chapter does not subscribe to any variant of what Luciana Parisi has called the ‘metadigital fallacy’ (that is the belief discrete entities make up universal codes that underpin and animate everything in the universe).⁵ Yet it does regard international law as having undergone a still-ongoing transformation associated with an influx of the ‘weird formalism’ (Parisi’s term) of the digital the effects of which are anything but reductive.⁶

Digital logic works with discrete units in binary relation: one and zero, on and off, something or nothing. This logic is discontinuous and presupposes gaps between elements—gaps that, in digital circuitry, must be spanned by wires, gates and latches. According to digital logic, no value can be ascribed to any intermediate state between one and zero: this is an embedded prohibition or agreement that comprises part of the juridical infrastructure of digital technology. As Julian Bigelow pointed out at the famous Macy Conferences of 1946-1953, this ‘involves a forbidden ground in between and an agreement never

⁵ Luciana Parisi, *Contagious Architecture: Computation, Aesthetics, and Space* (Cambridge, Mass.: MIT Press 2013) at 36–43.

⁶ Parisi, *Contagious Architecture: Computation, Aesthetics, and Space*, at ix–xviii.

to assign any value whatsoever to that forbidden ground, with a few caveats on the side'.⁷ Accordingly, at any particular point in time or space (for example, in any one pixel of a digital image), a digital signal might leap from one value to another without regard to the state that preceded it. The representation of interim values is disallowed without those in-between values being subsumed into any continuum.

Appropriately for a binary scheme, the grasping of digital logic depends on its distinction from analogue logic. Analogue logic is concerned with continuous qualities along a scale: that is, with continuity, comparability, sequence and similarity. Analogue differences are differences of degree, not those of opposition or either/or distinction.⁸ Analogue technologies 'map[] continuums precisely whereas the digital computer can only be precise about boundaries'.⁹ Units of analogue representation and analysis are divisible into smaller units without any necessary loss of significance, while digital analysis cannot employ units of analysis below the level of the discrete unit on which it depends. Cartographic delineation of governmental or administrative units within territorial states is an example of analogue technology at work because the areas in question tend to be nested within comparable units of greater and lesser scale together comprising the international.

Digital significations are denotative and precise at their edges (which by no means implies that they are representationally accurate, exhaustive or reliably indexable to a referent). They identify and delimit elements in ways that are opposable to all other elements at a particular point in time. The digital is oriented towards either/or events as distinct from an analogue concern with both-and processes and more-or-less similarities. Whereas analogue communication tends to employ icons that claim some enduring resemblance to the signified (the thing represented), digital communication employs symbols (digits) that maintain no inherent connection between signifier and signified; in digital settings any such

⁷ Bernard Siegert, 'Coding as Cultural Technique: On the Emergence of the Digital from Writing AC' (2018) 70 *Grey Room* 8–23 at 9, quoting Julian Bigelow in Claus Pias (ed), *Cybernetics-Kybernetik: The Macy Conferences 1946-1953 vol 1* (Zurich: Diaphanes Verlag 2003), 187.

⁸ Anthony Wilden, 'Analogue and Digital Communication: On the Relationship between Negation, Signification and the Emergence of the Discrete Element' (1972) 6 *Semiotica* 50–82; Anthony Wilden, *System and Structure: Essays in Communication and Exchange* (2nd edn, London: Tavistock 1980).

⁹ Wilden, *System and structure*, at 162.

connection must be learned or ascribed (as and when required). The digital thus presupposes ‘breaks in referentiality’; its ‘epistemological power’ is not conditional upon maintaining any lasting relation or continuity between the symbolic and the real (in contrast to analogue logic that continually posits such relations).¹⁰ As Andrew Piper has observed, ‘[e]rror is fundamental to any understanding of [the] digital’.¹¹

Not all contemporary computing or communication is, of course, digital. Analogue computing (employing the continuously variable aspects of physical phenomena, such as electrical or mechanical quantities, to model a problem) has enjoyed something of a resurgence of late and quantum information theory has grown in prominence and promise over recent years. Also, digital computing does not expunge all analogue logic; the relative comparability of different computers to human minds has been a continuous point of reference in the development of digital computing, for example.¹² Nevertheless, digital logic looms large wherever information and computing technologies are deployed. Blockchain technology, for example, exhibits digital logic because of the denotative quality of the cryptographic hashing on which it depends and its reliance on distributed ledger reproducibility, neither of which accommodates more-or-less similarities.¹³

The pervasion of the international legal field by digital technology and logic since the end of the old Cold War has been apparent in many areas of international legal work and concern. One illustration is the change in the public face of the UN, discernible from a comparison of its website as it was on 4 January 1997 (as archived by the Internet Archive) and in its current version.¹⁴ This is also apparent in the juxtaposition of two images of women engaging with technology at the UN from 1968 and 2017 in

¹⁰ Siegert, ‘Coding as Cultural Technique: On the Emergence of the Digital from Writing AC’, 18.

¹¹ A. Piper, ‘Digitization’ in A. Blair, P. Duguid, A.-S. Goeing, A. Grafton (eds.), *Information: A Historical Companion* (Princeton; Oxford: Princeton University Press 2021) 402–6, at 404.

¹² Alan M. Turing, ‘Computing Machinery and Intelligence’ (1950) 59 *Mind* 433–60.

¹³ Fleur Johns, ‘Centers and Peripheries in a World of Blockchain: An Introduction to the Symposium’ 115 *AJIL Unbound* 404–7.

¹⁴ Compare <https://web.archive.org/web/19970104075414/http://www.un.org/> and www.un.org/.

Figures 35.1 and 35.2 respectively. Below these images is a brief panorama of the international legal ramifications of this shift in the economy, war and politics.



Figure 35.1
The Library of the United Nations, 5 November 1968 © UN Photo/Yutaka Nagata¹⁵



Figure 35.2
UN Women Global Innovation, Technology and Entrepreneurship Industry Forum, 14 September 2017 © UN Women/Ryan Brown¹⁶

¹⁵ Retrieved from www.flickr.com/photos/un_photo/3546064371 under an Attribution-NonCommercial-NoDerivs 2.0 Generic license (CC BY-NC-ND 2.0). Full terms available at <https://creativecommons.org/licenses/by-nc-nd/2.0/>.

¹⁶ Retrieved from www.flickr.com/photos/unwomen/37234790271 under an Attribution-NonCommercial-NoDerivs 2.0 Generic license (CC BY-NC-ND 2.0). Full terms available at <https://creativecommons.org/licenses/by-nc-nd/2.0/>.

Digitalisation of the global economy and its international laws

The many ways in which the global economy—and the international law integral to it—have been unevenly digitalised are impossible to detail comprehensively. This section presents a brief synopsis of how digital technologies and logics have pervaded the global production, accumulation, recording, transfer, distribution and realisation of value with the support and influence (and sometimes in spite) of international law. These transformations were well underway before the end of the Cold War.¹⁷ Nonetheless, this section focuses largely on their manifestations from 1990 onwards. The brevity of this account should not be taken to imply that their progression has been uniform or uncontested; nothing could be further from the truth.

International law's post-Cold War digitalisation in the economic domain was predicated on the development of satellite technology and the global undersea fibre optic cable network—developments that were, in part, of international legal provenance and substance.¹⁸ These global techno-legal infrastructures allowed for the advance of the Internet: that network of computer networks that has been central to international law's digitalisation in the economic field, as much as in war and politics. The story of the Internet's construction, including its legal dimensions and dependencies, is one 'rooted in the 1960s—in both the "closed world" of the Cold War and the open and decentralized world of the antiwar movement and the counterculture'.¹⁹ It is also intimately connected to histories

¹⁷ F. Johns, 'Shadowboxing: The Data Shadows of Cold War International Law' in G. Simpson, M. Craven, S. Pahuja (eds.), *International Law and the Cold War*, (Cambridge: Cambridge University Press 2019), 137–58.

¹⁸ H. R. Slotten, *Beyond Sputnik and the Space Race: The Origins of Global Satellite Communications* (Johns Hopkins University Press 2022); M. Craven, "'Other Spaces': Constructing the Legal Architecture of a Cold War Commons and the Scientific-Technical Imaginary of Outer Space", (2019) 30 *European Journal of International Law* 547–572; N. Starosielski, *The Undersea Network* (Durham, N.C.: Duke University Press 2015); S. von Schorlemer, 'Telecommunications, International Regulation' in *Max Planck Encyclopedia of Public International Law* (Oxford: Oxford University Press 2009); M. A. Rothblatt, 'ITU Regulation of Satellite Communication' (1982) 18 *Stanford Journal of International Law* 1–26.

¹⁹ R. Rosenzweig, 'Wizards, Bureaucrats, Warriors, and Hackers: Writing the History of the Internet' (1998) 103 *The American Historical Review* 1530–52 at 1531.

of capitalism and the ‘booming postwar culture of business machines’.²⁰ That story has been told many times elsewhere, both in its own right and amid histories of computing.²¹

For purposes of grasping its ramifications for post-Cold War international law, two features of the Internet are especially noteworthy. The first is its decentralised, multi-nodal structure. The second is its openness to continuous extension via many different interfaces and modes of digital connection. These features ensured resilience: in the face of any attack, obstruction or breakdown, alternative channels are typically available. They also enabled concurrent transmission at higher speeds and volumes than a closed circuit would allow: ‘packet-switching’ breaks up messages into discrete components that may be sent independently of one another along multiple pathways for later reassembly.

These features of the Internet have presented a kind of meta-model of distributed global connectivity and coordinated action among discrete, discontinuous components with legally facilitated interoperability. This has exerted tremendous influence on international legal practice and thinking throughout the post-Cold War period.²² From the outset the political valences of this meta-model were indeterminate: it might have aligned just as well with Soviet and other socialist cybernetic visions of control as with Hayekian faith in spontaneous self-organisation. Nevertheless, the demise of the Soviet Union meant that the latter came to predominate, at least for a time, among international lawyers’ readings and transpositions of this model onto global economic affairs.²³

In addition to its influence in shaping international legal imaginaries of the global economy, the Internet has become increasingly indispensable to global economic activity since the end of the Cold

²⁰ A. Piper, ‘Digitization’ in A. Blair, P. Duguid, A.-S. Goeing, A. Grafton (eds.), *Information: A Historical Companion* (Princeton; Oxford: Princeton University Press 2021) 402–6, at 402.

²¹ J. Abbate, *Inventing the Internet* (Cambridge, Mass.: MIT Press 1999); J. Abbate and S. Dick (eds.), *Abstractions and Embodiments: New Histories of Computing and Society* (Baltimore: Johns Hopkins University Press 2022); M. S. Mahoney, ‘The histories of computing(s)’ (2005) 30 *Interdisciplinary Science Reviews* 119–35.

²² A. Riles, *The network inside out* (Ann Arbor: University of Michigan Press 2000).

²³ A. Lang, *World Trade Law after Neoliberalism: Reimagining the Global Economic Order* (Oxford University Press 2011).

War, thanks in part to the work of international soft lawmakers such as the Internet Corporation for Assigned Names and Numbers (ICANN).²⁴ Internet connectivity has also been in a mutually constitutive relation with post-Cold War international law: both depending on international legal norms and institutions and helping, to some extent, to shape their course. The same may be said of mobile broadband and wireless telecommunications services, also integral to the digitalisation of the global economy (and to war and politics in the international legal realm, discussed later).

Mobile telephony dated from the mid-1940s, but it was only with the introduction of cellular radio networks (the first generation of which was introduced in Europe, US and Japan between the early 1950s and the 1970s) that the volume and speed of communication became unconstrained by the scarcity of radio frequencies.²⁵ This was because cellular networks (comprised of land areas, called cells, each serviced by one or more fixed-location radio transceivers sending and receiving messages on different frequencies) enabled reuse of the same frequencies.²⁶ The mobile phone systems that came into commercial operation in the early 1980s were, nevertheless, analogue systems involving storage of data in the form of electronic waveform signals and continuous transmission and modulation of electronic pulses. These networks were adversely affected by ‘noise’, their power consumption levels were relatively high, and they were non-standardised, ensuring limited mobility and interoperability among them.

Around the end of the 1980s, mobile telephony came to adhere to digital standards presupposing transmission via discrete binary signals. Initially, there were a number of contending ‘global’ standards for this put forward in the US, Japan and Europe supporting what became known as second (2G) and third (3G) generation mobile telecommunications systems.²⁷ Both generations employed

²⁴ J.-C. Woltag, ‘Internet’ in *Max Planck Encyclopedia of Public International Law* (Oxford: Oxford University Press 2010).

²⁵ T. Dunnewijk and S. Hultén, ‘A brief history of mobile communication in Europe’ (2007) 24 *Telematics and Informatics* 164–79.

²⁶ L. Walters and P. S. Kritzinger, ‘Cellular networks: past, present and future’ (2000) 7 *XRDS: Crossroads, The ACM Magazine* 4–35.

²⁷ M. Mingos, ‘Is the Internet mobile? Measurements from the Asia-Pacific region’ (2005) 29 *Telecommunications Policy* 113–25.

combinations of packet switching (discussed above) and circuit switching (whereby dedicated resources within a radio network are assigned for the duration of a call or transmission). With the first mobile phones with Internet connectivity having been introduced in the 1990s and their rapid diffusion after 2007 (following launch of the iPhone and the Android mobile operating system),²⁸ these systems had to support growing Internet usage via mobile phones and other ‘smart’ (that is, Internet-connected) devices. Accordingly, from around 2010 onwards, 2G and 3G systems have been incrementally overtaken in many parts of the world by fourth generation (4G) broadband cellular networks relying solely on packet switching and otherwise predominantly meeting a single, global standard for wireless digital broadband communication: LTE (Long Term Evolution), as defined by the International Telecommunications Union (ITU), a specialized agency of the UN.²⁹ At the time of writing, the ITU was in the process of rolling out global standards and specifications for fifth generation (5G) wireless broadband networks, services and devices incorporating a range of underlying technologies designed to increase wireless communications’ reliability, flexibility, speed and scalability.

These digital technologies have transformed global economic activity significantly, impacting manufacturing as well as transactional, pricing, logistical and other communications integral to global economic affairs. Internet-mediated, satellite-mediated and wireless digital communications—and the laws and standards on which their development and operation depend—have become fundamental to the global production and distribution of goods and services and to their consumption worldwide, even in the case of many artisanal goods and localised services. Securities trading and investment has been widely automated so that value may be sought in market events not humanly discernible until after the fact (if at all).³⁰ More recently, from the late 2000s onwards, currencies—both national and

²⁸ M. Kakihara, ‘Grasping a Global View of Smartphone Diffusion: An Analysis from a Global Smartphone Study’ (ICMB2014: 2014 International Conference on Mobile Business, London, 4-5 June 2014) <https://aisel.aisnet.org/icmb2014/11/>.

²⁹ D. Westphal, ‘International Telecommunication Union (ITU)’ in *Max Planck Encyclopedia of Public International Law* (Oxford: Oxford University Press 2014).

³⁰ D. MacKenzie, ‘A material political economy: Automated Trading Desk and price prediction in high-frequency trading’ (2017) 47 *Social Studies of Science* 172–94.

non-governmental—have been digitalised and given novel, cryptographic forms making use of blockchain technology.³¹ These offer ‘alternative[s] to state money: digital money that is backed not by the power of coercion but by control of data’.³²

All these digitally mediated economic interactions are riddled with analogue architecture: that is, with norms and institutions oriented towards maintaining continuity, comparability, sequence and similarity in legal and economic terms. Nonetheless, the digitalisation of the global economy demands new things of international law, many reflective of digital logic as described above. International law has long been oriented towards delimiting jurisdictions—literally and proverbially—and tempering meaning-making and high-level disputation in the global economy. Now, it is expected to monitor and infiltrate an immense plurality of normative systems and centres of authority to try to assert and maintain a “vertically integrated” structure of economic decision-making’.³³ International trade law has had to take account of digital trade and voluminous cross-border data flows and attend to their channels and stoppages.³⁴ International law has sought to address itself in highly personalised ways to the economic affairs of individual persons and firms—via targeted sanctions, for instance—seeking to track and attach to their pseudonyms, spin-offs and subsidiaries.³⁵ International financial regulation aspires (potentially) to embed itself in the protocols of decentralised finance: ‘an ecosystem of financial applications that are built on top of blockchain networks’.³⁶ To try to ensure their effectiveness, international legal measures have often been broken down into ‘data packets’ to become ‘interoperable with... biometric [and other] databases’.³⁷ In short, international law has been

³¹ N. A. Plassaras, ‘Regulating Digital Currencies: Bringing Bitcoin within the Reach of IMF Comment’ (2013) 14 *Chicago Journal of International Law* 377–407; G. Dimitropoulos, ‘The Law of Blockchain’ (2020) 95 *Washington Law Review* 1117–92.

³² K. Pistor, ‘Statehood in the digital age’ (2020) 27 *Constellations* 3–18 at 4.

³³ F. Corradini, ‘The Struggle for International Financial Standards: An Historical Analysis of Entangling Legalities in Finance’ in N. Krisch (ed.), *Entangled Legalities Beyond the State* (Cambridge: Cambridge University Press 2021) 289–317, at 302.

³⁴ A. D. Mitchell and N. Mishra, ‘Data at the Docks: Modernizing International Trade Law for the Digital Economy’ (2017) 20 *Vanderbilt Journal of Entertainment & Technology Law* 1073–1134.

³⁵ D. W. Drezner, ‘Sanctions Sometimes Smart: Targeted Sanctions in Theory and Practice’ (2011) 13 *International Studies Review* 96–108.

³⁶ I. Salami, ‘Challenges and Approaches to Regulating Decentralized Finance’ (2021) 115 *AJIL Unbound* 425–29 at 425.

³⁷ G. Sullivan, *The Law of the List: UN Counterterrorism Sanctions and the Politics of Global Security Law* (Cambridge: Cambridge University Press 2020) at 110, 115.

impelled to move closer towards, and wherever possible to touch or affect, the discrete. In all these ways and others, international law concerned with global economic activity has taken on the discontinuous, all-or-nothing logic described above.

Digitally enabled reproducibility (or convertibility) and distributed connection in the global economy have also done away with some forms of scarcity, centralisation and monopoly (while generating others).³⁸ This has prompted the development of new ways to commodify, maintain value, assert market-dominance or sovereignty by means of law, policy and technical measures, infrastructure investments and ‘platformisation’ (use of digital infrastructures and business models to direct activities through certain channels to facilitate the collection and monetisation of digital data). Accordingly, value- and interest-preserving hierarchies have taken on new juridical formats on the global plane: from the protection via private law (and private international law) of business confidences and trade secrets to the embedding of certain privileges and prerogatives in global Internet protocols and other technical standards.³⁹ These, in turn, have come to condition participation and redistribution in the global digital economy, helping to generate new forms of marginality, precarity and inequality as well as compounding (or sometimes surmounting) old forms.

Treaties and international organisations remain pivotal in the operations of this digitalised global economy, as do states authorised and bound by international law. At the same time, international, regional and national standard-setting organisations and other entities involved in promulgating technology protocols (the International Standards Organisation; the European Telecommunications Standards Institute; the Internet Engineering Task Force; and so on) have become pivotal.⁴⁰ And key

³⁸ O. Sezneva and S. Chauvin, ‘Has Capitalism Gone Virtual? Content Containment and the Obsolescence of the Commodity’ (2014) 1 *Critical Historical Studies* 125–50.

³⁹ J. E. Cohen, *Between Truth and Power: The Legal Constructions of Information Capitalism* (New York: Oxford University Press 2019); A. R. Galloway, *Protocol: How Control Exists after Decentralization* (Cambridge, Mass.: MIT Press 2004); L. DeNardis, *The Internet in Everything: Freedom and Security in a World with No Off Switch* (New Haven, Connecticut: Yale University Press 2020); J.L. Contreras (ed.), *The Cambridge Handbook of Technical Standardization Law: Competition, Antitrust, and Patents* (Cambridge & New York: Cambridge University Press 2018); P. Delimatsis (ed.), *The Law, Economics and Politics of International Standardisation* (Cambridge: Cambridge University Press 2015).

⁴⁰ P. Delimatsis (ed.), *The Law, Economics and Politics of International Standardisation* (Cambridge: Cambridge University Press 2015); Galloway, *Protocol: How Control Exists after Decentralization*.

decision-makers in the latter contexts do not typically fall within the purview of international law's conventional repertoire of mandates and deliberations—at least not directly.

Digitalisation of war and its international laws

Alongside these econo-legal transformations, the lawful making of war and international legal efforts to temper and curtail war have grappled with the digitally mediated diversification of sites and modes of military conflict—and international law has been transformed in the process.⁴¹ The 1990-1991 Gulf War was an important instance of these changes coming to the fore. It 'was the first major conflict fought against the background of accessible global telecommunications' (utilising digital standards, as noted above).⁴² This signalled to many parties a growing sense of digital technologies' indispensability in modern warfare and the imperative of international law speaking more explicitly to the use of such technologies.

The 1991 Gulf War use of satellite-based radio navigation systems known as Global Positioning Systems (or GPS), for instance, enabled allied forces to navigate the featureless desert throughout the day and night, ensuring that they were no longer reliant on outdated maps or weather-contingent visibility.⁴³ Meanwhile, precision-guided munitions, utilising digital nose-cameras and digital data-processing guidance systems, 'not only... ma[de] certain categories of targets vulnerable for the first time, but also... increase[d] the *number* of targets that [could] be attacked' in parallel because any one fighter-bomber had a significantly enhanced likelihood of hitting a given target ensuring that multiple sorties per target were no longer necessary.⁴⁴ The battlefield presence of these munitions increased rapidly thereafter, at least in interstate armed conflict. Whereas less than ten per cent of attacks in

⁴¹ Johns, 'Shadowboxing'.

⁴² P. M. Taylor, *War and the Media* (Manchester University Press 1998) at x.

⁴³ M. R. Rip and D. P. Lusch, 'The precision revolution: The Navstar global positioning system in the second Gulf War' (1994) 9 *Intelligence and National Security* 167–241.

⁴⁴ K. L. Shimko, *The Iraq Wars and America's Military Revolution* (Cambridge: Cambridge University Press 2010) at 81 (emphasis in original).

Operation Desert Storm launched by the US and its allies in 1991 involved precision targeting, nearly seventy per cent of the attacks launched in Operation Iraqi Freedom in 2003 were so targeted.⁴⁵ Over the same period, information warfare involving digital communications technology became an increasingly prominent strategic dimension of war.⁴⁶

Digitalisation not only transformed conventional warfare. It also inaugurated new modalities of war. In 1993, an influential publication of the US-based RAND Corporation announced that ‘cyberwar is coming’: that is, that states and other military actors on the international plane would soon be ‘conducting, and preparing to conduct, military operations according to information-related principles’.⁴⁷ Twenty years later, political scientist Thomas Rid reflected critically on this prediction, arguing that cyberspace had not become a further domain of lethal military conflict among states so much as a setting for largely non-violent confrontation among a range of parties through computer espionage and weaponised code.⁴⁸ (One stake in these disagreements was what counts as violence.) Other commentators have emphasised instead the hybridisation of war with other kinds of force in the decades since the end of the Cold War.⁴⁹ And some forms of that hybridization have been enabled through the medium of digital technology (as in instances of military conflict being financed through online trading in illicit goods, cyber-facilitated extortion, and money-laundering through cryptocurrencies and other digital media). In the face of these contending accounts of the degree to which war has ‘gone cyber’, international lawyers have sought nonetheless to promulgate a body of legal doctrine, or adapt existing doctrine, to address a wide range of military ‘cyber operations’.⁵⁰

⁴⁵ M. N. Schmitt, ‘Precision attack and international humanitarian law’ (2005) 87 *International Review of the Red Cross* 445–66 at 453.

⁴⁶ W. Merrin, *Digital War: A Critical Introduction* (Abingdon: Routledge 2018).

⁴⁷ J. Arquilla and D. Ronfeldt, ‘Cyberwar is Coming!’ (1993) 12 *Comparative Strategy* 141–65 at 146.

⁴⁸ T. Rid, *Cyber War Will Not Take Place* (New York: Oxford University Press 2013).

⁴⁹ M. Kaldor, *New and Old Wars: Organized Violence in a Global Era*, 3rd ed. (Stanford: Stanford University Press, 2012).

⁵⁰ M. N. Schmitt, *Tallinn Manual 2.0 on the International Law Applicable to Cyber Operations*, Second ed. (Cambridge: Cambridge University Press 2017).

International legal efforts to juridify war both kinetic and cyber have helped to fuel and shape these digital transformations. The aspiration for more precise targeting through computational means has been fuelled in part by international humanitarian law requirements and arguably also by the burgeoning discourse of international criminal law. As Samuel Moyn has explored, international humanitarian law's demand for certain kinds of judgment and distinction has been integral to the advance of drone warfare.⁵¹ Likewise, international legal stress on the assessment of imminence in an adversary's attack, in combination with vast troves of digital data amenable to predictive, computational analysis, have 'elongated imminence' in Moyn's terms,⁵² supporting the pre-emptive deployment of military force.

At the same time, international lawyers have often tapped the digitalisation of war as a novel source of purpose for their work. Understood as 'a body of law that was drafted with traditional kinetic warfare in mind', international humanitarian law has invited updating and extension in the face of digitalisation.⁵³ Its instruments may be '[f]ormally still in force' on the digitalised battlefield, but they are often seen as 'unable to capture the relations that [digitalisation] engenders'.⁵⁴ To some international lawyers, this has been greeted as a momentous new assignment for their discipline.

As international lawyers have laboured to meet the challenges of digital warfare, the law so generated has itself increasingly taken on the on/off logic of digitality. This is apparent, for instance, in international legal instruments requiring that the design of anti-personnel mines include 'a back-up self-deactivation feature' and recommending that legally mandated 'fail safes' or 'kill switches' be incorporated into autonomous weaponry.⁵⁵ Elsewhere, international lawyers have argued for ever-

⁵¹ S. Moyn, *Humane: How the United States Abandoned Peace and Reinvented War* (New York: Farrar, Straus and Giroux 2021).

⁵² Moyn, *Humane*, 287.

⁵³ C. Droege, 'Get off my cloud: cyber warfare, international humanitarian law, and the protection of civilians' (2012) 94 *International Review of the Red Cross* 533–78 at 533.

⁵⁴ M. Liljefors, G. Noll, and D. Steuer (eds.), *War and Algorithm* (London: Rowman & Littlefield 2019) 199–200; see further G. Noll, 'War by Algorithm: The End of Law?' in Liljefors, Noll, and Steuer, *War and Algorithm* 75–103.

⁵⁵ Protocol on Prohibitions or Restrictions on the Use of Mines, Booby-Traps and Other Devices as amended on 3 May 1996 (Protocol II) annexed to the Convention on Prohibitions or Restrictions on the Use of Certain Conventional Weapons which may be deemed to be Excessively Injurious or to have Indiscriminate Effects, Geneva, 3 May 1996, 2048 UNTS 93,

greater refinement of legal notions of responsibility and attribution so that law might attach more directly to discrete individuals and artefacts.⁵⁶ Many international lawyers seem to aspire, on international law's behalf, to the ubiquity and ceaseless operativity of digital technology. With this comes a sense of loss for some, as though 'all [law's] potentiality [might] pass[] instantaneously into actuality', narrowing the space for legally occasioned reflection on the international plane.⁵⁷ This raises the question of what global politics might be commensurate with international law so digitalised, to which the next section turns.

Digitalisation of global politics and its international laws

Each of the preceding subsections has already addressed the digitalisation of different dimensions and registers of global politics, economic and military, and considered some aspects of international law pertaining to those domains. This section, however, adopts a more straitened, compartmentalised view of the 'political' of a kind that prevails in some quarters of international law. According to this view, 'global politics' is concerned explicitly with the form, organization, powers and administration of states and intergovernmental relations among them. Even when so narrowly framed (without regard to, say, feminist theorisations of the political), the impact of digitalisation on global politics and its international laws is readily apparent. This is discernible with respect to states' territories, populations and governments and their intergovernmental relations. In other words, each of the constitutive components of states' political and juridical authority according to the international legal doctrine of statehood has been remade, to varying degrees, by digitalisation.

Technical Annex, Para. 3(a); M. van Kralingen, 'Use of Weapons: Should We Ban the Development of Autonomous Weapons Systems?' (2016) 18 *The International Journal of Intelligence, Security, and Public Affairs* 132–56 at 153.

⁵⁶ H.-Y. Liu, 'Refining responsibility: differentiating two types of responsibility issues raised by autonomous weapons systems' in N. Bhuta, S. Beck, R. Geiß, H.-Y. Liu, C. Kreß (eds.), *Autonomous Weapons Systems: Law, Ethics, Policy*, (Cambridge: Cambridge University Press 2016) 325–44.

⁵⁷ Liljefors, Noll, and Steuer, *War and Algorithm*, 199.

Territory

The way that territory is understood and analysed for global political and legal purposes is being fundamentally reconfigured as states and international organisations turn more and more to the automated analysis of the earth's surface employing massive, distributed, digital data streams and a vast, globally dispersed infrastructure to store and transmit them.⁵⁸ Of course, the practice of rendering territory informational for international legal purposes is not a wholly new phenomenon. The division of a spherical world into evenly spaced meridians using latitude and longitude, for example, is of ancient provenance, although it was not until the eighteenth century that these were reliably measured.⁵⁹ Furthermore, it was through a late nineteenth century international law conference and treaty regime that one such meridian became a common, international point of reference for locational and time-keeping purposes.⁶⁰ This ensured capacity to measure, survey and describe parcels of territory with accuracy and created a way of experiencing time-space in common at a global scale. Datafication in this mode has long been a feature of global politics and international law.

The representation of territory in and as *digital* data—and the geo-political significance of the placement of physical infrastructure essential to that—has, however, intensified to a very significant degree with the advent of orbital satellites, GPS and technologies of automatic sensing, Google mapping and the like. A profusion of sensor networks, and advances in their sophistication, have fostered aspirations to seed the planet with continuously operating data-collection and data-generation nodes in order to anticipate and respond rapidly to global political strife. This breaks with analogue logics of territory because digital transmission from ubiquitous sensor nodes has—at the level of discrete pixels (in the case of images) or samples (in the case of sound)—an all-or-nothing quality. When digitally sensed,

⁵⁸ F. Johns, 'Data Territories: Changing Architectures of Association in International Law' in Martin Kuijer and Wouter Werner (eds), *Netherlands Yearbook of International Law 2016: The Changing Nature of Territoriality in International Law* (The Hague: TMC Asser Press 2017) 107-129.

⁵⁹ J. Evans, *The History and Practice of Ancient Astronomy* (Oxford: Oxford University Press 1998); N. Samana, *Global Positioning: Technologies and Performance* (Hoboken, N.J.: Wiley 2008).

⁶⁰ W.G. Perrin, 'The Prime Meridian' (1927) 13 *The Mariner's Mirror* 109-124; R.F. Higgitt and G. Dolan, 'Greenwich, Time and the Line' (2010) 34 *Endeavour* 35-39.

territory can be made potentially actionable or not at a microscale; it becomes reproducibly discontinuous. Digitally encoded images or sounds can be transmitted in near-perfect reproduction up to the point where the noise level (or the amount of unwanted signal interference) occludes a significant number of bits, at which point their transmission will completely fail. Digitalisation opens territoriality up to the prospect of this kind of error or failure. When impregnated in a landscape, territoriality appears enduring. Once territory is digitalised, however, this persistence cannot be presumed. No longer does territory's oversight for purposes of global political action hinge upon some continuously variable (analogue) physical quantity, such as positioning relative to known cultural or political landmarks.

Territory so 'datafied' still performs bounding, distributive and placement functions for international legal and political purposes. Yet it does so in a distinctively digital mode. State territoriality becomes a matter of managing, maintaining and analysing a dynamic, information-rich, time-sensitive 'planetary skin' comprised of discrete digital bits. The term 'planetary skin' here references the work of the Planetary Skin Institute: a non-profit organization co-founded by Cisco and NASA in 2008-2009 with the goal of building a platform for planetary eco-surveillance.⁶¹ NASA has since made available online an opensource virtual globe, compatible with multiple operating systems, through its NASA WorldWind initiative.⁶² And Hewlett Packard continues to advance the Central Nervous System for the Earth (CeNSE) project: a highly intelligent network of billions of nanoscale sensors designed, HP Labs say, 'to feel, taste, smell, see, and hear what is going on in the world'.⁶³ All of these projects depend on the partitioning, ordering and naming of cells for unique spatial indexing.

Territory so digitalised is less predisposed to continual fencing and bounding in the manner conventionally required to sustain states' territorial claims and border enforcement activities, although

⁶¹ J.D. Stanley, 'Planetary Skin Institute ALERTS: Automated Land Change Evaluation, Reporting and Tracking System' (Association for Computing Machinery 2011) <https://dl.acm.org/doi/10.1145/1999320.1999388>.

⁶² F. Pirotti, M. A. Brovelli, G. Prestifilippo, G. Zamboni, C. E. Kilsedar, M. Piragnolo, and P. Hogan, 'An open source virtual globe rendering engine for 3D applications: NASA World Wind' (2017) 2 *Open Geospatial Data, Software and Standards* 4.

⁶³ Hewlett Packard, 'CeNSE, HP Official Site' (2014) www.hp.com/us-en/hp-information/environment/cense.html#.YOWEmBMzYUr.

conventional bordering activity continues apace. Analogue borders on the global plane are typically presumed to be continuous and unbroken, barring inter-state disputes. Analogue property rights in international law tend to vary by degrees along a spectrum: from sovereign rights of exclusion and immunity to variable rights of exploration and extraction in different domains. Digitalised territory has more of a pixelated quality; it allows for much more granular differentiation between this piece of territory and that. Digital representations of territory suggest that states' international legal authority and political presence might be switched on or off in precise locations and at certain times. Meanwhile, for states, the task of patrolling state boundaries is becoming as much about data collection, indexing, distribution, curation and personalisation as it is about explicit marking of boundaries. For these reasons, states worry as much about their access and proximity to digital infrastructure—to the world's satellites and undersea cables, for instance—as they do about maintaining and defending their physical borders.

State territory so digitalised fits awkwardly into conventional analogue frameworks and institutions for the conduct of politics on the international legal plane. Such frameworks and institutions offer relatively few means for states to contest digitalised boundaries or to raise concerns about transboundary incursions or exclusions of a digital kind. International legal institutions continue to prioritise the resolution of conventional territorial boundary disputes and the analogue delimitation of jurisdiction. Yet unconventional political disputes are arising in the context of territories' digitalisation. In 2010, for example, Nicaraguan military and government officials admitted to an 'accidental' invasion of Costa Rican territory. This involved Nicaraguan troops taking down a Costa Rican flag and erecting a Nicaraguan one on Costa Rican territory. The invasion was attributable, the Nicaraguan troop commander said, to an error on Google Maps that misrepresented the location of the border between the two countries by some 2.7 kilometers.⁶⁴ Google Maps' misrepresentation of the disputed German-

⁶⁴ M. Brown, 'Nicaraguan Invasion? Blame Google Maps' (*Wired*, 8 November 2010) www.wired.com/2010/11/google-maps-error-blamed-for-nicaraguan-invasion/.

Dutch border in Dollart Bay has likewise been a source of interstate consternation.⁶⁵ In the wake of these and other disputes, Google has gone to some lengths to explain and defend its technical arbitration of disputed cartography.⁶⁶ In these and countless other ways, territory and territorial disputes—core to international legal renderings of global politics—are being digitalised.

Populations

Governance of populations—that is, governance of humans and nonhumans organised into comparable, statistically analysable units—has been core political business on the international plane since well before the Cold War. Alison Bashford has characterised international organisations’ and states’ framing of and engagement with population problems throughout the twentieth century as ‘the imaginative activity through which the “daily work of human beings” was linked to the idea of a global polity’.⁶⁷ Traditionally, this entailed representing populations by certain forms of proxy—typically, representative samples—for purposes of (analogue) analysis and comparison. However, insofar as global governance has become oriented not around populations but around digital aggregates—that is, around composites of digital data, repurposed to shed light on people, places and things, that have not been purposively, systematically, or randomly sampled—the imaginative and regulatory work encouraged thereby is of quite a different order.

Think of the digital dashboards used across government and in decision-making by governments’ corporate contractors and delegates, at every scale, including internationally.⁶⁸ Consider digital platforms assembled to try to help governmental and nongovernmental agencies to direct aid where it is most needed in the aftermath of a disaster, typically pursuant to some international legal mandate or

⁶⁵ F. Jacobs, ‘Bordering on Bizarre: Google Maps Fail in Dollart Bay’ (*Strange Maps*, 2 March 2011) <https://bigthink.com/strange-maps/504-nil-bordering-on-bizarre-google-maps-fail-in-dollart-bay/>

⁶⁶ E. R. Merel, ‘Google’s World: The Impact of “Agnostic Cartographers” on the State-Dominated International Legal System’ (2015) 54 *Columbia Journal of Transnational Law* 424–453.

⁶⁷ A. Bashford, *Global Population: History, Geopolitics, and Life on Earth* (New York: Columbia University Press 2014) at 17.

⁶⁸ J. Bartlett and N. Tkacz, *Governance by Dashboard: A Policy Paper* (London: Demos 2017); see further N. Tkacz, *Being with Data, The Dashboarding of Everyday Life* (London: John Wiley & Sons 2022).

authority.⁶⁹ The digital aggregates that they represent are usually composed of digital data from multiple sources, processed by a range of public and private mediators, spanning different spatial and temporal scales, but often incorporating real-time data. Governments, international organisations and their many private sector partners are increasingly captivated by such digital aggregates as expressions of the end, the object and the appropriate field of intervention for global governance work. Populations in statistical, actuarial or biopolitical terms frequently appear beneath, behind, or embedded within the dazzle of the digital aggregate.⁷⁰

Illustrative of these shifts of governmental attention towards digital aggregates (before or beside statistical populations) is the increasing use of, and widening aspirations to use, digital data to assemble official statistics at both national and international scales. These have been nurtured by initiatives such as the Global Working Group on Big Data for Official Statistics created by the UN Statistical Commission in 2015.⁷¹ Data employed for this purpose—some sparsely and experimentally and some, in the case of supermarket scanner data, for instance, quite routinely in certain countries⁷²—include anonymised mobile phone data to assemble migration and tourism statistics, supermarket scanner data to help generate inflation statistics, satellite surface reflectance data to assemble agriculture statistics and social media data to infer levels of consumer confidence for economic reporting purposes.⁷³ In such settings, conventional statistical populations, such as those made up of national survey respondents, are problematised, with emphasis laid on the expense, respondent burden and lack of timeliness associated with surveying populations.⁷⁴ The object that comes into view instead, when attention is directed toward digital data sources in the hope of

⁶⁹ F. Johns and C. Compton, 'Data jurisdictions and rival regimes of algorithmic regulation' (2022) 16 *Regulation & Governance* 63–84.

⁷⁰ F. Johns, 'Governance by Data' (2021) 17 *Annual Review of Law & Social Science* 53–71, at 61–64.

⁷¹ P. J. H. Daas, M. J. Puts, B. Buelens, and P. A. M. van den Hurk, 'Big Data as a Source for Official Statistics' (2015) 31 *Journal of Official Statistics* 249–62.

⁷² D. Melser, 'Scanner Data Price Indexes: Addressing Some Unresolved Issues' (2018) 36 *Journal of Business & Economic Statistics* 516–22.

⁷³ D. Salgado and B. Oancea, 'On new data sources for the production of official statistics' (2020) *arXiv preprint arXiv:2003.06797*.

⁷⁴ B. Cakici and E. Ruppert, 'Methods as forces of subjectivation: experiments in the remaking of official statistics' (2020) 13 *Journal of Cultural Economy* 221–35.

addressing these problems, is a composite, mobile, digital aggregate. That aggregate is assembled opportunistically: marked by whatever properties may be inferred from digital data incidentally generated by online or remotely detectible activities. Global politics still demands the rallying, mobilisation and governance of national populations, but must now entail marshalling and grappling with digital aggregates too, with the two (population and digital aggregate) frequently misaligned.

Government and intergovernmental relations

The contemporary practice of government and conduct of intergovernmental relations around the globe has also taken on new dimensions associated with the incursion of digitality. Digital technology increasingly mediates governments' interactions with their employees, citizens and residents, with those seeking asylum within their jurisdictions, and with their governmental or diplomatic counterparts. Data scientists are, for instance, now routinely involved in the production of official government statistics, as noted above. Tax assessment, collection and compliance monitoring are increasingly digitalised and tax law and policy formulation have taken on new forms and participants accordingly.⁷⁵ The administration and distribution of welfare entitlements have been widely (albeit not universally) digitalised.⁷⁶ Online dispute resolution forums and processes—both public and private—have proliferated.⁷⁷ Laws and practices of border control, intelligence-gathering and counterterrorism have all been transformed by states' growing reliance on digital technologies and data.⁷⁸

In the process of having growing recourse to digital data in these and other settings, governments are being recomposed and reoriented. Many countries' governments now include chief information officer,

⁷⁵ R. Mason, 'The Transformation of International Tax' (2020) 114 *American Journal of International Law* 353–402.

⁷⁶ M. R. Busemeyer, A. Kemmerling, K. V. Kersbergen, and P. Marx (eds.), *Digitalization and the Welfare State* (Oxford University Press 2022).

⁷⁷ O. Rabinovich-Einy and E. Katsh, 'Digital Justice: Reshaping Boundaries in an Online Dispute Resolution Environment' (2014) 1 *International Journal of Online Dispute Resolution* 5–36.

⁷⁸ L. Amore, 'The deep border' (2021) *Political Geography* (forthcoming) preprint available at doi.org/10.1016/j.polgeo.2021.102547; D. Van Den Meerssche, 'Virtual Borders—International Law and the Elusive Inequalities of Algorithmic Association' (2022) 33 (1) *European Journal of International Law* (forthcoming); G. Sullivan, *The Law of the List: UN Counterterrorism Sanctions and the Politics of Global Security Law* (Cambridge: Cambridge University Press 2020).

chief technology officer, and chief innovation officer roles, as well as countless, related subordinate roles, such as the ‘e-governance champions’ that India has sought to embed in its line ministries.⁷⁹ The OECD has a programme of work tracking and comparing how governments are making use of digital technology to pursue their policy goals nationally and internationally.⁸⁰

These efforts of governmental digitalisation have seen technology companies’ products and staff become influential mediators of governmental and intergovernmental relations globally. The US-based, New York Stock Exchange-listed company Palantir is one example. In 2019, the World Food Programme (WFP) announced its entry into a five-year ‘partnership’ with Palantir aimed at helping the WFP better use its data to streamline the delivery of food and cash-based assistance in emergency relief operations around the world. This followed an initial pilot programme in Iraq in which Palantir helped reduce the WFP’s food basket costs by more than ten percent. It did so by making small changes in these baskets’ content, such as swapping out one commodity for something similar or changing procurement sources, all without reducing aggregate nutritional value.⁸¹ Much as automated securities trading arbitrages small, digitally-discernible differences in value that only become apparent through the processing of vast volumes of digital data, Palantir introduced a litany of small on/off digital adjustments into the WFP’s operations to optimise their performance against analogue scales (both nutritional and budgetary). Palantir is just one of the digital players involved in the work of governing globally. Also in Iraq, for example, the Public Distribution System was digitalised in collaboration with the WFP so that applicants for food aid might interact with the government via a mobile phone application programming interface: ‘Tamwini’ (My Food Ration).⁸² This system incorporated iris

⁷⁹ ‘United Nations E-Government Survey 2020: Digital Government in the Decade of Action for Sustainable Development’ (UN Department of Economic and Social Affairs 2020) <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2020>.

⁸⁰ OECD, ‘Digital Government’ <https://www.oecd.org/gov/digital-government/>.

⁸¹ World Food Programme, ‘Palantir and WFP partner to help transform global humanitarian delivery’ (5 February 2019) www.wfp.org/news/palantir-and-wfp-partner-help-transform-global-humanitarian-delivery.

⁸² World Food Programme, ‘WFP and the Iraqi Ministry of Trade Launch a Food Ration Smartphone App for 1.6 Million People in Iraq’ (28 June 2021) www.wfp.org/news/wfp-and-iraqi-ministry-trade-launch-food-ration-smartphone-app-16-million-people-iraq.

scanning technology, reportedly supplied by a UK company IrisGuard.⁸³

Digital iris scanning to dis-individuate welfare claimants entails a very different mode of governmental interaction with applicants for government assistance than the taking of names, addresses, and other personal, familial and communal information by an official.⁸⁴ Iris scanning verifies identification discretely from the automated comparison of iris code (a digital representation of patterns extracted from images of the iris) to stored databases of the same. It is an on/off process that presumes no relation to others, in contrast to analogue techniques of governmental identification. Similarly, the gathering of data from mobile phones for purposes of welfare distribution attenuates needs for governmental assistance to the scale of individual mobile phone subscribers or device-holders (since subscriptions may be shared). In each case, analogue measures of need (poverty lines, for example) persist, but digitalisation translates these into a series of discrete values—that is, the values ascribed to each unit in the poverty estimation grid or to each mobile phone subscriber or user.

Governments are undertaking similar initiatives in the conduct of their foreign relations to help them manage the profusion of digital data and data sources of political import. For example, in 2020-2021, the Indonesian Ministry of Foreign Affairs (MoFA) teamed up with the UN Global Pulse initiative (via Pulse Lab Jakarta) and Indonesia's National Development Planning Agency (BAPPENAS) to 'develop a machine learning visualization tool using [natural language processing of manually labelled] declassified documents to analyse digital information received from its global outposts and extract insights to inform diplomatic engagement'.⁸⁵ It did so seeking to enhance its capacity to conduct informed dialogue with foreign governments and other stakeholders. In these and other ways, the practice of digitising governmental and intergovernmental operations in global politics is making of

⁸³ World Food Programme, 'WFP Supports Iraq in Modernising Its Public Distribution System' (9 January 2019) www.wfp.org/news/wfp-supports-iraq-modernising-its-public-distribution-system.

⁸⁴ F. Johns, 'Data, Detection, and the Redistribution of the Sensible in International Law' (2017) 111 *American Journal of International Law* 57–103.

⁸⁵ Annissa Zahara, Utami Diah Kusumawati and Dwayne Carruthers, 'Adapting to Data-Driven Diplomacy with Machine Learning' (UN Global Pulse, 25 February 2021) www.unglobalpulse.org/2021/02/adapting-to-data-driven-diplomacy-with-machine-learning/.

those something other than they have previously been. International laws hard and soft at the heart of these shifts—international organisations’ and governments’ contracts with technology providers; international data sharing and information security standards; bilateral technical assistance agreements and so on—must grapple continually with the demands of governmental and intergovernmental digitalisation.

In all these ways and others, global politics and their international legal expression—in territorial claims and disputes; measurement and management of the needs of populations; and the work of government and intergovernmental relations—are becoming digital: that is, pixelated, inconstant and oriented towards the discrete and discontinuous. Whereas international law has often traded in political ideals of continuity and commonality—notions of global citizenship and narratives of developmental progress, for instance—digital practices of global politicking push in another direction. The resulting disjunction is not something that international law infused with digital logic is well-disposed to resolve being concerned, as it is, with contingently ascribed or learned connections always revisable in the face of new inputs. As in economics and war, digital renderings of global politics demand new extensions of the international legal repertoire.

Conclusion

International law's digitalisation since the end of the first Cold War is not just apparent in the three domains surveyed above, but also in the conduct of international legal research and practices of international legal advocacy, judgment, and argument.⁸⁶ In all these ways and more, international law has taken on rhythms, registers and focal points associated with the logic of digitality since the Cold War's end, in persistent tension with international law's predominantly analogue architecture. This digitalisation of international law contributed to initial, post-Cold War confidence in the necessity and inevitability of democracy's spread. Techno-determinism helped to underwrite a sense of legal and political destiny for a time and expanded access to digital media was expected by some to prompt a global devolution of political power (expectations that have largely gone unmet). At the same time, digitalisation has helped to fuel anxiety about international law's fragmentation; prevailing digital technology's distributed, multi-nodal character reinforced some international lawyers' worries about normative disaggregation and disunity. More recently, digitalisation has become a significant frontier for the advance of New Cold War and other neo-imperial rivalries and for a diversity of struggles, attachments and affiliations that sidestep or resist those.

For a relatively brief time, for some, post-Cold War digitalisation seemed to suggest the prospect of inhabiting a smaller, more convergent, legally graspable world. At the turn of the millennium, one US-based scholar claimed that 'electronic communication enables us to reach across the globe to initiate and maintain relationships at a level never before possible.'⁸⁷ By the end of the first decade of the new millennium, however, this selective optimism (or hubris) had largely faded. Digitalisation seemed to

⁸⁶ A. Koenig, E. Irving, Y. McDermott, and D. Murray, 'New Technologies and the Investigation of International Crimes: An Introduction' (2021) 19 *Journal of International Criminal Justice* 1–7; M. Roscini, 'Digital Evidence as a Means of Proof before the International Court of Justice' (2016) 21 *Journal of Conflict and Security Law* 541–54; W. Alschner, 'The Computational Analysis of International Law' in R. Deplano, N. Tzagourias (eds.), *Research Methods in International Law*, (Cheltenham: Edward Elgar 2021) 203–27.

⁸⁷ J. W. Dellapenna, 'Law in a Shrinking World: The Interaction of Science and Technology with International Law' (1999) 88 *Kentucky Law Journal* 809–84, at 815.

many commentators to herald new divergences of value and points of vulnerability for international law.⁸⁸

Digitally mediated divergences persist and take new forms. Commons and commoning enshrined in twentieth century international legal doctrine have started to come apart at their (always-present) seams as digital and other technologies help to underwrite resurgent prospecting, extractivism and opportunism in Outer Space, in the Antarctic, and under the oceans.⁸⁹ The global burgeoning of autocracy and novel forms of scarcity and inequality have been nourished by new or newly pervasive digital technologies, and international law's encouragement to binge on these in the name of development.⁹⁰ Meanwhile, some conventional state-based allegiances and responsibilities—fundamental to international law—have come to seem more difficult to maintain or discharge, or to demand ever greater investments in technology not feasible for all.⁹¹ All the while, there have remained vast tracts of the earth where electrification still has not materialised for many, let alone digitalisation.

Digital technology does not lay claim to comprehensiveness or invite cosmopolitan oneness; it presupposes breaks, occlusions and countless parallel transmissions. Digitalisation directs international lawyers' attention towards the ceaseless accumulation of particulars (or proxies for particulars) in such a way that it can seem harder to maintain an international legal repertoire premised on aspirant universalism, whether in a mode of universalised domination or the fantasy of a virtuous, reflective 'we'.⁹² Digitalisation has, nonetheless, supported distributed networks of affiliation, activism and care as well as those of control and consumption (with care and control, activism and consumption often

⁸⁸ See, e.g., M. Land, 'Toward an International Law of the Internet' (2013) 54 *Harvard International Law Journal* 393–458.

⁸⁹ P. D. Filippi and A. Leiter, 'Blockchain in Outer Space' (2021) 115 *AJIL Unbound* 413–18; J. McGee, B. Arpi, and A. Jackson, "'Logrolling" in Antarctic governance: Limits and opportunities' (2020) 56(e34) *Polar Record* 1-11; S. Ranganathan, 'Manganese Nodules' in J. Hohmann, D. Joyce (eds.), *International Law's Objects* (Oxford: Oxford University Press 2018) 272–83.

⁹⁰ I. Porras, 'Binge Development in the Age of Fear: Scarcity, Consumption, Inequality, and the Environmental Crisis' in B. Stark (ed.), *International Law and its Discontents: Confronting Crises* (Cambridge: Cambridge University Press 2015) 25–83.

⁹¹ Johns, 'Governance by Data'.

⁹² S. Pahuja, *Decolonising International Law. Development, Economic Growth and the Politics of Universality* (Cambridge University Press 2011).

entangled).⁹³ International law approached as struggle over disaggregated terrain, conducted in anticipation of error, omission and failures-to-connect: this is what international lawyers must face working with after digitalisation. This is not necessarily a bad thing but, returning to the musical metaphor with which this chapter began, it does call upon international lawyers to learn some new tunes, instruments, and dance moves.

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