

The Big Data of International Migration: Opportunities and Challenges for States under International Human Rights Law

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Technology, as the epitome of our contemporary society, permeates the realm of international migration. Migrants and refugees are increasingly using mobile phones and digital features available online to prepare for migration and while on the move. Concurrently, advances in computer science allow for progressively more accurate analysis of the data generated by mobile devices and online searches. In particular, big data can be used to determine specific behavioural patterns, geolocation and human interactions. This article investigates the implications of these technological advances for States under international human rights law. It argues that big data can and should be used as a tool for the protection of migrants' human rights by enhancing both decision-making and measures to prevent unnecessary deaths at sea, ill-treatment and human trafficking of migrants. Consequently, the article examines whether the development of new technologies can affect States' capabilities for the identification of individuals in need of protection. It posits that to the extent that protection is mandated by human rights instruments, States may have a positive obligation to use available technologies to identify and assist vulnerable migrants. It evaluates this possibility against the protection of migrants' right to life, the prohibition of torture, inhuman and degrading treatment, and the prohibition of slavery and forced labour. In doing so, the article also emphasizes the limits and risks posed by the unrestrained use of new technologies, notably with respect to the protection of migrants' right to privacy and data protection.

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I. INTRODUCTION

Technology is ever present in the ongoing global migration crisis.¹ Migrants and refugees are increasingly using mobile phones and digital features available on Facebook or Google to communicate with family members, to find better routes, and to stay informed about the situation in transit and destination countries.² At the same time, advances in computer science allow for progressively more accurate aggregation and analysis of the data generated by mobile devices and online searches, determining specific behavioural patterns and human interactions.³ Yet, research

¹ The term migrants is used here to encompass regular and irregular immigrants as well as asylum-seekers.

² See United Nations High Commissioner for Refugees [hereinafter “UNHCR”], *Connecting Refugees. How Internet and Mobile Connectivity can Improve Refugee Well-Being and Transform Humanitarian Action*, at 5 (Sept. 2006) available at <http://www.unhcr.org/5770d43c4> (affirming that refugees often spend up to a third of their disposable income on staying connected) ; *Phones are now indispensable for refugees*, THE ECONOMIST (Feb. 11, 2017).

³ See notably ROB KITCHIN, *THE DATA REVOLUTION: BIG DATA, OPEN DATA, DATA INFRASTRUCTURES & THEIR CONSEQUENCES* (2014).

is scarce in relation to the use of big data analysis in international migration management and its implications for the protection of migrants' human rights.⁴

Big data can be defined as the 'large volumes of high velocity, complex and variable data that require advanced techniques and technologies to enable the capture, storage, distribution, management, and analysis of the information.'⁵ Part of this data originates in interactions mediated by social media channels or online platforms that allow users to create and exchange content.⁶ This type of 'big social data' constitutes a major part of human-generated data, such as text, images, audio, and video.⁷ 'Big social data' therefore can be defined as 'large data volumes that relate to people or describe their behaviour and technology-mediated social interactions in the digital realm'.⁸ Additionally, individuals leave digital footprints by simply searching for information via online search engines such as Google.⁹ Migrants' digital footprints, whether originating in social media interactions or relating to online searches, can be used to determine individual behaviour and also to inform trends in migratory flows.¹⁰

⁴ See notably Fleur Johns, *Data, Detection, and the Redistribution of the Sensible in International Law*, 111 AM. J. INT'L L. 57 (2017) (for an analysis of the implications of new technologies in international law, with emphasis on machine learning and biometric data collected by the UNHCR); Elspeth Guild, *The Right to Dignity of Refugees: A Response to Fleur Johns*, 111 AM. J. INT'L L. UNBOUND 193 (for a timely reflection on the implications of new technologies for human dignity and legal personality).

⁵ Tech America Foundation's Federal Big Data Commission, *Demystifying big data: A practical guide to transforming the business of Government* (2012) available at <https://statswiki.uncece.org/pages/viewpage.action?pageId=80053387>.

⁶ Social media is a term that encompasses social networks (e.g. Facebook), blogs (e.g. WordPress), microblogs (e.g. Twitter), social news (e.g. Reddit), media sharing (e.g. YouTube), wikis (e.g. Wikipedia), and review sites (e.g. TripAdvisor). See Amir Gandomi & Murtaza Haider, *Beyond the hype: big data concepts, methods, and analytics*, 35 INT. J. INFORM MANAGE 137 (2014) 142 (for a definition of social media and a discussion of social media analytics); Andreas M. Kaplan & Michael Haenlein, *Users of the world, unite! The challenges and opportunities of Social Media*, 53 BUSINESS HORIZONS 59 (2010) (describing the concept of social media, and discussing how it differs from related concepts such as Web 2.0 and User Generated Content).

⁷ Gandomi & Haider, *supra* note 6, at 138 & 143 (explaining that text, images, audio, and video are examples of unstructured data which amounts to 95% of all big data, whereas structured data such as the tabular data found in spreadsheets or relational database constitutes only 5% of all existing data).

⁸ Ekaterina Olshannikova et al., *Conceptualizing Big Social Data*, 4 J. BIG DATA 1 (2017).

⁹ See Oguzhan Gencoglu et al., *Collecting a Citizen's Digital Footprint for Health Data Mining*, CONF. PROC. IEEE ENG. MED. BIOL. SOC. 7626, 7626 (2015) (digital footprints are understood as 'the trail of digital information created about us and by our actions' and can be categorised into two main groups: active and passive. Active corresponds to 'the stored data which is deliberately shared by oneself' whereas passive relates to 'the case when data is collected without one's knowledge').

¹⁰ See Emilio Zagheni & Ingmar Weber, *You are where you email: Using e-mail data to estimate international migration rates*, ACM WEB SCIENCE CONF. PROC., 497 (2012) available at <https://dl.acm.org/citation.cfm?id=2380764>; Bogdan State et al., *Studying Inter-National Mobility through IP Geolocation*, ACM WEB SEARCH & DATA MINING CONF. PROC., 265 (2013) available at <https://dl.acm.org/citation.cfm?id=2433432>; Emilio Zagheni et al., *Inferring International and Internal Migration Patterns from Twitter Data*, 23 WORLD WIDE WEB CONF. PROC., 439 (2014) available at <https://dl.acm.org/citation.cfm?id=2576930&CFID=825745417&CFTOKEN=91235132>; United Nations Global

Against the backdrop of the ongoing migration crisis, the protection of migrants' human rights in the digital era and the potential obligations of States to identify and assist vulnerable migrants are of great relevance. The article investigates the implications of these technological advances for State obligations under international human rights law (IHRL). It argues that the development of modern technologies can enhance the capabilities of States for the identification of individuals in need of protection. It examines big data from an angle that is not yet fully explored in the academic literature. Rather than analysing big data solely as an instrument of surveillance and control, the article argues that big data can and should be used as a tool for the protection of migrants' legal rights. It suggests that protection can improve decision-making and facilitate measures to prevent unnecessary deaths at sea, ill-treatment and human trafficking of migrants. It posits that, to the extent that protection is mandated by human rights instruments, States may have a positive obligation to use the available technologies to identify and assist vulnerable migrants.

This possibility is evaluated against the protection of three core human rights set forth by universal and regional human rights treaties: the right to life,¹¹ the prohibition of torture, inhuman and degrading treatment,¹² and the prohibition of slavery and forced labour.¹³ The choice of rights is based on their nature and significance. The prohibition of torture, inhuman and degrading treatment, and the prohibition of slavery and forced labour are absolute,¹⁴ while the right to life is

Pulse, *Estimating Migration Flows Using Online Search Data*, Global Pulse Project Series no. 4 (2014) available at http://www.unglobalpulse.org/sites/default/files/UNGP_ProjectSeries_Search_Migration_2014_0.pdf.

¹¹ As respectively provided by Article 3 of the Universal Declaration of Human Rights, Dec. 10, 1948, 217 A (III) [hereinafter "UDHR"]; Article 6, of the International Covenant on Civil and Political Rights, Dec. 16, 1966, 999 U.N.T.S. 171 [hereinafter "ICCPR"]; Article 2 of the European Convention for the Protection of Human Rights and Fundamental Freedoms, Nov. 4, 1950, 213 U.N.T.S. 221 [hereinafter "ECHR"]; Article 4 of the American Convention on Human Rights, Nov. 22, 1969, 1144 U.N.T.S. 123 [hereinafter "ACHR"].

¹² As respectively provided by Article 4 of the UDHR; Article 7 of the ICCPR; Article 3 of the ECHR; Article 5 of the ACHR.

¹³ As respectively provided by Article 5 of the UDHR; Article 8 of the ICCPR; Article 4 of the ECHR; Article 6 of the ACHR.

¹⁴ Article 15 (2) of the ECHR provides no possibility of derogation from Articles 3 and 4 ECHR in times of emergency or war; Article 27 (2) of the ACHR also establishes no derogations from the right to life, right to humane treatment and prohibition of slavery in times of war or emergency; Article 4 (2) of the ICCPR also provides that there should be no derogation in relation to Articles 6, 7 and 8 of the ICCPR in times of public emergency. See also *Questions Relating to the Obligation to Prosecute or Extradite (Belgium v. Senegal)*, Judgment, 2012 I.C.J. Rep. 422, ¶ 99 (July 2012) (affirming that "the prohibition of torture is part of customary international law and it has become a peremptory norm (*jus cogens*)"); *Soering v. United Kingdom*, App. No. 14038/88, ¶ 88 (Eur. Ct. H.R., Jul. 7, 1989) (affirming the absolute prohibition of torture and of inhuman or degrading treatment or punishment under the terms of the Convention); Separate Opinion of Judge ad hoc J. Dugard in *Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Rwanda)*, Judgment, 2006 I.C.J. Rep. 86, ¶ 10 (February 2006) (counting the prohibitions on aggression, genocide, torture and slavery and the advancement of self-determination as norms of *jus cogens*); *Fazenda Brasil Verde Workers v. Brasil*, Preliminary Objections, Merits, Reparations and Costs, Judgment,

considered a fundamental right and a prerequisite for the enjoyment of all other human rights.¹⁵ Additionally, questions relating to respect for the right to privacy and data protection are examined insofar as they set limits on the use of big data vis-à-vis international migration.¹⁶ The article draws upon the jurisprudence of international human rights courts and quasi-judicial bodies, in particular the European Court of Human Rights (ECtHR), the Inter-American Court of Human Rights (IACtHR) and the Human Rights Committee (HRC).

The analysis proceeds in three consecutive steps. Firstly, the article examines the changes in State capabilities and the uses of big data for better decision-making in international migration management. Secondly, it assesses the possibility of using big data as a tool of protection of vulnerable migrants. In particular, it investigates whether States have a positive obligation to use available technologies to identify and assist vulnerable migrants. Thirdly, it examines the limits and risks of the uses of big data in the field of international migration. The article concludes by calling on States to adopt a rights-based approach in this area as new technologies evolve.

II. BIG DATA AS A COMPLEMENTARY TOOL FOR INTERNATIONAL MIGRATION MANAGEMENT

A good understanding of migratory patterns is a key asset for informed decision-making. However, traditional statistical tools based on administrative sources, national population censuses and sample surveys present important disadvantages.¹⁷ For instance, sample surveys and national

Inter-Am. Ct. H. R. (ser. C) No. 318, ¶¶ 412-3 (Oct. 20, 2016) (affirming that the prohibition of slavery has the status of *jus cogens*). See also International Law Commission [hereinafter ILC], Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law, ¶ 374, UN Doc. A/CN.4/L.682 (2006) (explaining that “the most frequently cited candidates for the status of *jus cogens* include: (a) the prohibition of aggressive use of force; (b) the right to self-defence; (c) the prohibition of genocide; (d) the prohibition of torture; (e) crimes against humanity; (f) the prohibition of slavery and slave trade; (g) the prohibition of piracy; (h) the prohibition of racial discrimination and apartheid, and (i) the prohibition of hostilities directed at civilian population”). See also Steven Greer, *Is the Prohibition against Torture, Cruel, Inhuman and Degrading Treatment Really ‘Absolute’ in International Human Rights Law?*, 15 HRLR 101 (2015); Erika De Wet, *The Prohibition of Torture as an International Norm of jus cogens and Its Implications for National and Customary Law*, 15 EUR. J. INT’L L. 97 (2004).

¹⁵ See *McCann and others v. the United Kingdom*, App. No. 18984/91, ¶ 147 (Eur. Ct. H.R., Sept. 27, 1995) (affirming that Article 2 ECHR providing for the right to life “enshrines one of the basic values of the democratic societies making up the Council of Europe”); *Baldeón Gacía v. Peru*, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 147, ¶ 82 (Apr. 6, 2006) (affirming that “the right to life is a fundamental right, the full exercise of which is a prerequisite for the enjoyment of all other human rights”).

¹⁶ See *infra* Section IV, B.

¹⁷ Marzia Rango, *How big data can help migrants*, WORLD ECONOMIC FORUM, 2 (October 5, 2015) available at <https://www.weforum.org/agenda/2015/10/how-big-data-can-help-migrants/> (explaining that these traditional statistical sources have important limitations); Peter Struijs et al., *Official statistics and Big Data*, BIG DATA & SOC’Y 1, 2

population censuses can be resource-intensive and time-consuming. The accuracy and relevance of such traditional tools are also limited to the time at which the data is collected in the sense that they only measure past behaviour.¹⁸ These factors limit the utility of traditional tools for predicting migratory trends.

Reception of migrants and refugees in the context of large scale displacement could be more efficiently planned and managed if State authorities in transit and destination countries were willing to use a combination of big data and traditional statistical data effectively. For instance, traditional statistical data and mobility forecasts were certainly available to European countries in the summer of 2015, when the upshots of the Syrian conflict were severely shown in terms of migration.¹⁹ The European Border and Coast Guard Agency (Frontex)²⁰ had pointed out that “the unprecedented number of migrants crossing illegally the external borders has roots in the fighting in Syria that has resulted in the worst refugee crisis since the Second World War.”²¹ Yet, the European response to the large influxes of asylum-seekers from Syria was highly unsatisfactory.²² As summarized by Professor Guy Goodwin-Gill, “the current crisis in the movement of people was, if not predictable, then at least foreseeable as a consequence of demographic pressure, turmoil, civil strife

(2014) (explaining that big data sources “may be used to substitute or supplement more traditional data sources, such as questionnaire and administrative data” in the context of location data).

¹⁸ See notably, Rango, *supra* note 17, at 2; Andrew McAfee & Erik Brynjolfsson, *Big Data: The Management Revolution*, HARV. BUS. REV. 1, 6 (2012) (explaining that real-time big data analysis in the context of real property retail was more efficient in predicting near-term forecasts on the housing market than the official sources).

¹⁹ See Eurostat, *EU Member States granted protection to more than 185 000 asylum seekers in 2014. Syrians remain the main beneficiaries* (May 12, 2015) available at <http://ec.europa.eu/eurostat/documents/2995521/6827382/3-12052015-AP-EN.pdf/6733f080-c072-4bf5-91fc-f591abf28176>;

²⁰ The European Border and Coast Guard Agency (Frontex) was established by the European Parliament and Council Regulation (EU) 2016/1624, on the European Border and Coast Guard 2016 O.J. (L 251) 1. This regulation replaces the former European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union and repeals the former Council Regulation (EC) 2007/2004, 2004 O.J. (L 349) 1. See notably, VIOLETA MORENO-LAX, *ACCESSING ASYLUM IN EUROPE: EXTRATERRITORIAL BORDER CONTROLS AND REFUGEE RIGHTS UNDER EU LAW* (2017) at 155-80 (for a comprehensive overview of Frontex’s origins, development, structure, tasks and powers); Efthymios Papastavridis, *Fortress Europe’ and FRONTEX: Within or Without International Law?*, 79 NORDIC J INT’L L 75 (2010) (for an analysis of Frontex operations in light of the International Law of the Sea).

²¹ Frontex, *Annual Risk Analysis 2015*, 9 (Apr., 2015) available at http://frontex.europa.eu/assets/Publications/Risk_Analysis/Annual_Risk_Analysis_2015.pdf (explaining that the ‘the unprecedented number of migrants crossing illegally the external borders has roots in the fighting in Syria that has resulted in the worst refugee crisis since the Second World War. Indeed, most of the detections at the borders concerned migrants from Syria, who later applied for asylum within the EU’).

²² See Sergio Carrera et al., *The EU’s Response to the Refugee Crisis: Taking Stock and Setting Policy Priorities*, CEPS, 20 (2015) available at www.ceps.eu (for a comprehensive analysis of the main results and policy outputs from the EU’s interventions to the refugee crisis).

and long-standing conflicts.”²³ Indeed, large movements of refugees and migrants could have been better addressed if decision-makers had paid more attention to the existing indicators, intelligence and available statistical data in 2015.²⁴

Big data could provide an additional advantage for decision-makers as the information is not exclusively obtained through traditional State bodies and authorities.²⁵ Data collection relates, for instance, to mobile phone usage, social media and other types of online service usage, and online searches.²⁶ All of these are person-generated data. Individuals have in principle consented to the collection, storage and sometimes use of their data by the social media channels and online services.²⁷ Furthermore, research demonstrates that it is possible to use Wireless Fidelity (WiFi) network connected to mobile devices such as smartphones to identify the device and estimate its location.²⁸ Besides, migrants leave a considerable digital footprint as a result of their activities

²³ Guy Goodwin-Gill, *Setting the Scene: Refugees, Asylum-Seekers, and Migrants at Sea – the Need for a Long-Term, Protection-Centred Vision*, in VIOLETA MORENO-LAX & EFTHYMOS PAPASTAVRIDIS (eds.), 'BOAT REFUGEES' AND MIGRANTS AT SEA: A COMPREHENSIVE APPROACH: INTEGRATING MARITIME SECURITY WITH HUMAN RIGHTS 17, 19 (2016).

²⁴ EUROSTAT, *Asylum applicants and first instance decisions on asylum applications: 2014*, 8 & 23 (March 20, 2015) available at <http://ec.europa.eu/eurostat/documents/4168041/6742650/KS-QA-15-003-EN-N.pdf/b7786ec9-1ad6-4720-8a1d-430f9c55018> (explaining that there was a substantial increase of number of asylum applicants during 2014 in the 28 Member States of the EU with a breakdown by applicants' nationalities. This dataset was entirely based on administrative sources provided to Eurostat by the Member States relevant authorities and agencies, indicating that traditional statistical tools were available for consultation). See also Frontex, *FRAN Quarterly Quarter*, 4 & 8 (2015) available at http://frontex.europa.eu/assets/Publications/Risk_Analysis/FRAN_Q4_2014.pdf (mainly using statistical data provided by participating States); Frontex, *Annual Risk Analysis*, 9 (2015) available at http://frontex.europa.eu/assets/Publications/Risk_Analysis/Annual_Risk_Analysis_2015.pdf (indicating that the main sources originate in statistical data from member States and other EU agencies). See also Satoko Horii, *The effect of Frontex's risk analysis on the European border controls*, 17 EUR. POL. & SOC'Y 242, 247 (2016) (explaining how the common risk analysis model operates within the context of Frontex and how EU member States provide key data for the risk assessment).

²⁵ See for instance UNHCR, *New World Bank-UNHCR joint data centre to improve global statistics on forced displacement* (Oct. 20, 2017) available at http://www.unhcr.org/news/press/2017/10/59ea0f984/new-world-bank-unhcr-joint-data-centre-improve-global-statistics-forced.html?mc_cid=638321ddc4&mc_eid=4d54ca0cce (affirming that one of the objectives of this new data centre is to “promote innovations to enhance forced displacement data through satellite imagery, cell phones, and other new technologies”).

²⁶ See World Economic Forum, *Rethinking Personal Data: Strengthening Trust* (2012) available at http://www3.weforum.org/docs/WEF_IT_RethinkingPersonalData_Report_2012.pdf (see page 34 for a detailed diagram of all aspects of life covered by personal data).

²⁷ See notably Fred H. Cate & Viktor Mayer-Schonberger, *Notice and Consent in a World of Big Data*, 3 INT'L DATA PRIVACY L. 67, 68 (2013) (discussing the formality of notice and consent in collecting and processing big data).

²⁸ Alfredo Alessandrini et al., *WiFi positioning and Big Data to monitor flows of people on a wide scale*, PROC. EUR. NAV. CONF. 2017, 322, 322 (2017) available at <https://ec.europa.eu/jrc/en/publication/wifi-positioning-and-big-data-monitor-flows-people-wide-scale> (“[s]martphones, tablets and many other devices use wireless connectivity. Whenever, one of these tools is active, the device broadcasts probe requests to identify known networks. For each device, the probe request contains a unique identifier: the Media Access Control (MAC) address. A MAC address is a 12- characters hexadecimal identifier: the first 6 digits identify the manufacturer, while the remaining digits identify the device. This

online.²⁹ Such footprints can be used to determine migratory patterns. For example, researchers have successfully traced migratory patterns in the Mediterranean region by comparing online data aggregated by Google Trends³⁰ with official data provided by governments and the United Nations High Commissioner for Refugees (UNHCR).³¹

Big data, and in particular social media data, has been effectively used for risk assessment and disaster management, healthcare and economic predictions.³² Analogously, big data analytics could prove useful in the field of international migration.³³ Insofar as the rules on data protection and privacy are respected,³⁴ big data and in particular big data analytics, could be a useful complement to traditional statistical tools.³⁵ Big data analytics are the ‘techniques used to analyze and acquire intelligence from big data’, including extracting meaningful information from text, audio, video, and data from social media channels.³⁶ In addition, predictive analytics techniques, which ‘seek to uncover patterns and capture relationships in data’ can be useful in capturing trends in migration

identifier is visible to a network whenever the user is in its range; so, the MAC address can potentially be used to collect information on the activities of users, tracking the movements of the device”).

²⁹ *Digital footprint*, OXFORD ENGLISH DICTIONARY (2017) (“the information about a particular person that exists on the Internet as a result of their online activity”).

³⁰ Google Trends is a publicly available online tool provided by Google in which search terms are showed in relation to their total search-volume across different regions of the world and different languages used (see <https://trends.google.co.uk/trends/>).

³¹ Pew Research Centre, *The Digital Footprint of Europe’s Refugees* (June 8, 2017) available at <http://www.pewglobal.org/2017/06/08/digital-footprint-of-europes-refugees>.

³² Huiji Gao et al., *Harnessing the Crowdsourcing Power of Social Media for Disaster Relief*, 26 IEEE INTELLIGENT SYSTEMS 10-14 (2011) (about the advantages and disadvantages of using social media for disaster relief); Xiangyang Guan & Cynthia Chen, *Using social media data to understand and assess Disasters*, 74 NAT. HAZARDS 837 (2014) (about the uses of social media and notably Twitter activities for rapid damage assessment); Jonathan Cinnamon et al., *Evidence and future potential of mobile phone data for disease disaster management*, 75 GEOFORUM 253 (2016) (for a critical analysis of uses of mobile phone data derived from call detail records and two-way short message service platforms for managing and responding to humanitarian disasters); Michael Ettredge et al., *Using Web-based Search Data to Predict Macroeconomic Statistics*, 48 Communications of the ACM, 87 (2005) available at <http://dl.acm.org/citation.cfm?id=1096010> (suggesting that online web searches data can be useful for forecasting economic statistics); Philip Polgreen et al., *Using Internet Searches for Influenza Surveillance*, 47 CLIN. INFEC. DIS., 1443 (2008) and Jeremy Ginsberg et al., *Detecting Influenza Epidemics Using Search Engine Query Data* 457 NATURE, 1012 (2009) (on how online web search data could be useful for predicting the incidence of diseases such as influenza); Hyunyoung Choi & Hal Varian, *Predicting the Present with Google Trends*, 88 ECON. REC. 2 (2012) (explaining that Google Trends data can help in predicting the present).

³³ See the European Commission Knowledge Centre on Migration and Demography’s Dynamic Data Hub, an interactive mapping tool that gives access to single datasets and provides visualisation of migration and demography data and trends: <https://bluehub.jrc.ec.europa.eu/migration/app/index.html>. See also Huub Dijkstra, *Migration tracking is a mess*, 543 NATURE 32 (2017) (arguing that technologies to monitor mobility are in reality political tools).

³⁴ See *infra* Section IV, B.

³⁵ See notably Rango, *supra* note 17; Piet J.H. Daas et al., *Big Data as a Source for Official Statistics*, 31 J. OFF. STAT. 249, 259 (2015) (affirming that “the official statistics community can greatly benefit from the possibilities offered by Big Data”).

³⁶ Gandomi & Haider, *supra* note 6, at 140.

flows.³⁷ For instance, data scientists could use data generated by individuals during natural disaster or conflict (e.g. Facebook check-in function, videos on online channels such as YouTube, photographs posted publicly via online platforms such Instagram or Pinterest, online searches for specific terms on Google) to predict migratory flows as the conflict or a natural disaster unfolds.³⁸

If correctly used, big data technology could contribute to achieving fairer and better-planned reception and integration strategies in the context of large movements of migrants and asylum-seekers.³⁹ For example, decision-makers could anticipate the nature and density of upcoming migratory inflows by using tools based on a combination of big data and traditional statistical data analysis.⁴⁰ Similarly, big data and traditional statistics can be used to map the diversity of migrant communities in cities.⁴¹ This would allow decision-makers to foresee which areas or neighbourhoods could attract specific migrant flows and would necessitate additional infrastructure such as housing, schools, or health care provision.⁴² However, all of these uses of big data relate to the management of migratory flows. Accordingly, the next section explores the extent to which big data could be used as a tool for the actual protection of vulnerable migrants.

³⁷ *Id.* at 143 (also explaining that predictive analytics techniques are subdivided into two groups. Some techniques, such as moving averages, attempt to discover the historical patterns in the outcome variable(s) and extrapolate them to the future. Others, such as linear regression, aim to capture the interdependencies between outcome variable(s) and explanatory variables, and exploit them to make predictions.)

³⁸ Junaid Qadir et al., *Crisis analytics: big data-driven crisis response*, 12 INT. J. HUMANITARIAN ACTION 1, 2 (2016).

³⁹ See Yann Algan et al., *Introduction: Perspectives on Cultural Integration of Immigrants*, in YANN ALGAN ET AL. (eds.), *CULTURAL INTEGRATION OF IMMIGRANTS IN EUROPE*, 1, 4-7 (2012) (for an overview of the different integration theories in social sciences); LUIGI SOLIVETTI, *IMMIGRATION, SOCIAL INTEGRATION AND CRIME. A CROSS-NATIONAL APPROACH*, 132 (2010) (identifying three forms of integration: social integration, cultural assimilation, and political participation).

⁴⁰ See for example Pew Research Centre, *The Digital Footprint of Europe's Refugees*, *supra* note 31 (“Turkey-based searches for the word “Greece” in Arabic closely mirror 2015 and 2016 fluctuations in the number of refugees crossing the Aegean Sea to Greece”).

⁴¹ See notably European Commission, Joint Research Centre, *Mapping migrant communities across Europe to support local integration* (Oct 11, 2017) available at <https://ec.europa.eu/jrc/en/news/mapping-migrant-communities-across-europe-support-local-integration>; European Commission, Knowledge Centre for Migration and Demography, *Migrants tend to go where they know someone*, fig.1 (2017) available at <https://ec.europa.eu/jrc/en/migration-and-demography/uptake/data/destination-choice>.

⁴² European Commission, Joint Research Centre, *supra* note 41.

III. BIG DATA AS A VALUABLE TOOL FOR THE PROTECTION OF VULNERABLE MIGRANTS

New technologies based on big data could also play an important role as a tool for the protection of vulnerable migrants,⁴³ and potentially affect the way in which States effectively protect their rights within their jurisdiction. This section examines the uses of these new technologies against the existing legal framework on State obligations under IHRL. Firstly, it assesses the matters of jurisdiction and nature of State obligations. Secondly, it focuses on the prevention of migrants' deaths at sea. Thirdly, it considers the protection against ill-treatment and human trafficking.

A. *Jurisdiction and State Obligations*

Under IHRL, State parties owe treaty obligations only to individuals who fall within their jurisdiction.⁴⁴ State jurisdiction can be triggered when individuals find themselves in a State's territory⁴⁵ and when a State exercises 'effective control' over an area outside its national territory.⁴⁶

⁴³ See on the concept of vulnerability: Martha Albertson Fineman, *The Vulnerable Subject and the Responsive State*, 60 EMORY L. J. 251, 268-9 (2010-2011) (for a definition of vulnerability as 'the characteristic that positions us in relation to each other as human beings and also suggests a relationship of responsibility between the state and its institutions and the individual'); BRYAN TURNER, *VULNERABILITY AND HUMAN RIGHTS* (2006) (arguing that vulnerability should be the common basis of human rights); Ana Beduschi, *Vulnerability on Trial: Protection of Migrant Children's Rights in the Jurisprudence of International Human Rights Courts*, 36 B.U. INT'L L. J. (forthcoming 2018) (arguing that vulnerability operates as a magnifying glass for State obligations in the context of the protection of migrant children's rights); Lourdes Peroni & Alexandra Timmer, *Vulnerable groups: The promise of an Emerging Concept in European Human Rights Convention Law* 11 INT. J. CONST. LAW 1056 (2013) (for a comprehensive analysis of the concept of vulnerability in the case law of the European Court of Human Rights).

⁴⁴ See on the concept of jurisdiction: Frederick Alexander Mann, *The doctrine of jurisdiction in international law*, THE HAGUE ACADEMY OF INTERNATIONAL LAW: RECUEIL DES COURS (1964); Bruno Simma & Andreas Th. Müller, *Exercise and Limits of Jurisdiction*, in THE CAMBRIDGE COMPANION TO INTERNATIONAL LAW 134, 135 (James Crawford & Martti Koskenniemi eds., 2012); MARKO MILANOVIC, *EXTRATERRITORIAL APPLICATION OF HUMAN RIGHTS TREATIES* (2011); Marko Milanovic, *Al-Skeini and Al-Jedda in Strasbourg*, 23 EUR. J. INT'L L. 121, 132 (2012).

⁴⁵ See Malcolm N. Shaw, *Territory in International Law*, 13 NETHERLANDS YEARBOOK INT'L L. 61 (1982) (for a comprehensive analysis of the concept of territory).

⁴⁶ See *Loizidou v. Turkey*, App. No. 15318/89, ¶ 62 (Eur. Ct. H.R., Mar. 23, 1995). See also *Delia Saldias de Lopez v. Uruguay*, Comm No. 52/1979, ¶ 12.3, U.N. Doc. CCPR/C/OP/1 88 (1984) ("[a]rticle 2 (1) of the Covenant places an obligation upon a State party to respect and to ensure rights "to all individuals within its territory and subject to its jurisdiction", but it does not imply that the State party concerned cannot be held accountable for violations of rights under the Covenant which its agents commit upon the territory of another State, whether with the acquiescence of the Government of that State or in opposition to it"); Human Rights Committee, *General Comment No 31: The Nature of the General Legal Obligation Imposed on States Parties to the Covenant*, ¶ 10, CCPR/C/21/Rev.1/Add. 1326 (May 2004) ("a State party must respect and ensure the rights laid down in the Covenant to anyone within the power or effective control of that State Party, even if not situated within the territory of the State Party"); *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory*, Advisory Opinion, 2004 I.C.J. 136 (Jul. 9) ¶111 ("the

Additionally, States have jurisdiction over individuals who are within their State agents' authority and control.⁴⁷ The hypothesis under examination relates to the use of big data for the identification and assistance of individuals at risk of death at sea, ill-treatment or human trafficking. Consequently, the present analysis concerns scenarios in which migrants have either entered a State's territory (including its territorial waters) or are in an area that is effectively controlled by that State. However, it is worth noting that States may incur responsibility if there is evidence of aid and assistance in the commission of a wrongful act by a third State.⁴⁸ In addition to IHRL, the law of the sea sets forth certain rules that bear on the protection of individuals on the high seas.⁴⁹ For instance, there is a general duty to render assistance to any person found at sea in danger of

Court considers that the International Covenant on Civil and Political Rights is applicable in respect of acts done by a State in the exercise of its jurisdiction outside its own territory"); Rights and Guarantees of Children in the Context of Migration and/or in need of International Protection, Advisory Opinion OC-21/14, Inter-Am. Ct. H.R. (ser. A) No.21, ¶ 219 (Aug. 19, 2014) ("[e]vidently, the fact that a person is subject to the jurisdiction of the State is not the same as being in its territory. Consequently, the principle of non-refoulement can be invoked by any alien over whom the State in question is exercising authority or who is under its control, regardless of whether she or he is on the land, rivers, or sea or in the air space of the State").

⁴⁷ See notably *Al-Skeini and others v. the United Kingdom*, App. No. 55721/07, ¶ 136 (Eur. Ct. H.R., Jul. 7, 2011) (explaining that "in certain circumstances, the use of force by a State's agents operating outside its territory may bring the individual thereby brought under the control of the State's authorities into the State's Article 1 jurisdiction"); the criteria of State authority and control over individuals giving way to extraterritorial jurisdiction was later confirmed by the ECtHR. See notably *Hirsi Jamaa v. Italy*, App. No. 27765/09, ¶ 74 (Eur. Ct. H.R., Feb. 23, 2012); *Hassan v. The United Kingdom*, App. No. 29750/09, ¶ 76 (Eur. Ct. H.R., Sept. 16, 2014); *Jaloud v. The Netherlands*, App. No. 47708/08, ¶ 139 (Eur. Ct. H.R., Nov. 20, 2014). See generally, MAARTEN DEN HEIJER, *EUROPE AND EXTRATERRITORIAL ASYLUM* (2012).

⁴⁸ For example, this could be the case in the context of maritime operations undertaken by Libyan forces which received financial aid and training from the EU and its member States if an internationally wrongful act was committed (e.g. ill-treatment of migrants), and if there was enough evidence that EU member States had the knowledge of the circumstances of the internationally wrongful act and if the act would be internationally wrongful if committed by one of the EU member States as per Article 16 of the ILC, Draft Articles on Responsibility of States for Internationally Wrongful Acts, UN A/56/10 (2001). See United Nations Human Rights Office of the High Commissioner (OHCHR), *UN human rights chief: Suffering of migrants in Libya outrage to conscience of humanity* (Nov. 2017) available at <http://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=22393&LangID=E> (affirming that "[w]e cannot be a silent witness to modern day slavery, rape and other sexual violence, and unlawful killings in the name of managing migration and preventing desperate and traumatized people from reaching Europe's shores"); Thomas Gammeltoft-Hansen & James C. Hathaway, *Non-Refoulement in a World of Cooperative Deterrence*, 53 COLUM. J. TRANSNAT'L L. 235 (for a comprehensive analysis of States shared responsibility and liability for aiding or assisting and its relationship to international refugee law).

⁴⁹ United Nations Convention on the Law of the Sea, art. 98, Dec. 10, 1982, 1833 U.N.T.S. 3 [hereinafter UNCLOS]; International Convention for the Safety of Life at Sea, reg. 33, Nov. 1, 1974, 1184 U.N.T.S. 278 [hereinafter SOLAS]; International Convention on Maritime Search and Rescue, reg. 2.1.1, Apr. 27 1979, 1405 U.N.T.S. 97 [hereinafter SAR Convention].

being lost and to rescue people in distress.⁵⁰ These rules fall outside of the realm of international human rights regimes and are therefore excluded from the present analysis.⁵¹

With respect to obligations within IHRL, States agree to respect, protect, and fulfil the legal rights set forth by the treaties that they ratify.⁵² The obligation to respect implies that the State must not deprive individuals from their rights.⁵³ The obligation to protect entails that States should protect individuals against human rights abuses, even if those originate in actions or omissions by private persons, insofar as the State can be seen as responsible.⁵⁴ The obligation to fulfil requires States to take positive steps to facilitate the enjoyment of an individual's human rights.⁵⁵ States must respect, protect and fulfil human rights with respect to all individuals within their jurisdiction, including foreigners.⁵⁶ Additionally, the European Court of Human Rights (ECtHR) and the Inter-American Court of Human Rights (IACtHR) distinguished between negative and positive obligations which in many aspects correspond to the obligations to respect, protect and fulfil.⁵⁷

⁵⁰ Article 98 (1) (a) and (b) of the UNCLOS.

⁵¹ For a discussion of State obligations on the high seas, see notably, EFTHYMOS PAPASTAVRIDIS, *THE INTERCEPTION OF VESSELS ON THE HIGH SEAS* (2013); Lisa-Marie Komp, *The Duty to Assist Persons in Distress: An Alternative Source of Protection against the Return of Migrants and Asylum Seekers to the High Seas?*, in VIOLETA MORENO-LAX & EFTHYMOS PAPASTAVRIDIS (eds.), *'BOAT REFUGEES' AND MIGRANTS AT SEA: A COMPREHENSIVE APPROACH: INTEGRATING MARITIME SECURITY WITH HUMAN RIGHTS* 222 (2016).

⁵² See Asbjørn Eide, *The Right to Adequate Food as a Human Right*, Report of the United Nations Special Rapporteur on the Right to Food, E/CN.4/ Sub.2/1987/23 (1987) (proposing a tripartite typology of State obligations in relation to respect, protection and fulfilment of human rights); HENRY SHUE, *BASIC RIGHTS: SUBSISTENCE, AFFLUENCE, AND US FOREIGN POLICY* 52 (1980) (proposing the following typology of duties owed by States in relation to human rights: to avoid depriving individuals of rights, to protect individuals from deprivation, to aid the deprived); Rolf Künneemann, *A Coherent Approach to Human Rights*, 17 *HUM. RIGHTS QUART.* 323, 328 (1995) (arguing that States have the obligation to respect, protect and fulfil the existential status of human beings, or "how human beings are entitled to live in relation to the State under these human rights"); Committee on Economic, Social and Cultural Rights, *General Comment No 12: The Right to Adequate Food (Art. 11)*, ¶ 15, E/C.12/1999/5 (May 12, 1999).

⁵³ See Künneemann, *supra* note 52, at 328 ("The obligation to respect obliges the State to avoid depriving a human being of this existential status in situations where that status has been attained"); Committee on Economic, Social and Cultural Rights, *General Comment No 12: The Right to Adequate Food*, *supra* note 52, ¶ 15 ("[t]he obligation to respect existing access to adequate food requires States parties not to take any measures that result in preventing such access").

⁵⁴ See John H. Knox, *Horizontal Human Rights Law*, 102 *AM. J. INT'L L.* 1 (2008) (on the imposition of duties vis-à-vis violations of human rights by private actors such as corporations); Eric Engle, *Third Party Effect of Fundamental Rights (Drittwirkung)*, 5 *HANSE L. REV.* 165 (2009) (for a general overview of the doctrine of third party effect); Stephen Gardbaum, *The 'Horizontal Effect' of Constitutional Rights*, 102 *MICH. L. REV.* 387(2003) (in the context of comparative constitutional law).

⁵⁵ See Künneemann, *supra* note 52, at 328 (arguing that the obligation to fulfil should not be understood as an obligation to provide as the latter has a subsidiary nature and prevents the State from incorporating the whole life of society).

⁵⁶ See notably Human Rights Committee, *General Comment No 15: The Position of Aliens under the Covenant*, ¶ 7, U.N. Doc. HRI/GEN/1/Rev.6 140 (Sept. 1986) (explicitly recognising that "aliens thus have an inherent right to life, protected by law, and may not be arbitrarily deprived of life. They must not be subjected to torture or to cruel, inhuman or degrading treatment or punishment; nor may they be held in slavery or servitude").

⁵⁷ Insofar as negative obligations relate to the obligation to respect human rights and positive obligations relate to the obligations to protect and fulfil human rights. See ALASTAIR MOWBRAY, *THE DEVELOPMENT OF POSITIVE*

Negative obligations entail that States should refrain from interfering in the exercise of rights, while positive obligations mean that States should adopt all measures necessary to safeguard the effective respect of rights.⁵⁸ The Human Rights Committee (HRC) has also emphasised that the legal obligation to respect and to ensure the rights recognized in the International Covenant on Civil and Political Rights (ICCPR) “is both negative and positive in nature”.⁵⁹ Accordingly, with this taxonomy in mind, the following analysis focuses primarily on the positive obligations of States.

B. *The Positive Obligation to Prevent Migrant Deaths at Sea*

It is generally accepted that States are not only obliged to refrain from the intentional and unlawful taking of life, but must also to take appropriate steps to safeguard the lives of those within their jurisdiction.⁶⁰ Therefore, States have a positive obligation to adopt measures to protect the lives of individuals, including against the criminal acts of a third party, and to investigate these situations effectively.⁶¹ This obligation should be considered as an obligation of conduct or means

OBLIGATIONS UNDER THE EUROPEAN CONVENTION ON HUMAN RIGHTS BY THE EUROPEAN COURT OF HUMAN RIGHTS (2004) (an authoritative reference relating to the study of positive obligations in the European Convention on Human Rights system); Dinah Shelton & Ariel Gould, *Positive and Negative Obligations*, in DINAH SHELTON (ed.), *THE OXFORD HANDBOOK OF INTERNATIONAL HUMAN RIGHTS LAW*, 562, 563 (2013) (“Global and regional human rights bodies have since then adopted the duality of positive and negative duties in judging a state’s compliance with its human rights obligations”); Frédéric Sudre, *Les obligations positives dans la jurisprudence européenne des droits de l’homme*, *REV. TRIM. DR. H.* 363 (1995) (for an overview of the positive obligations in the ECtHR’s jurisprudence); LAURENCE BURGORGUE-LARSEN & AMAYA UBEDA DE TORRES, *THE INTER-AMERICAN COURT OF HUMAN RIGHTS: CASE LAW AND COMMENTARY* 141 (Rosalind Greenstein trans., 2011) (“the Court [IACtHR] has taken bold decisions in the matter of positive obligations and has every intention of imposing on the States the provision of effective remedies, whatever this takes”); Laurens Lavrysen, *Positive Obligations in the Jurisprudence of the Inter-American Court of Human Rights*, 2 *INT. AM. & EUR. HUM. RTS. J.* 95, 96-7 (2014) (discussing the positive obligations recognised by the IACtHR).

⁵⁸ See notably, *Airey v. Ireland*, App. No. 6289/73, ¶ 32 (Oct. 9, 1979); *Marckx v. Belgium*, App. No. 6833/74, ¶ 31 (June 13, 1979)

⁵⁹ Human Rights Committee, *General Comment No 31: The Nature of the General Legal Obligation Imposed on States Parties to the Covenant*, *supra* note 46, ¶ 6.

⁶⁰ See *L.C.B. v. the United Kingdom*, App. No. 14/1997/798/1001, ¶ 36 (Eur. Ct. H.R., Jun. 9, 1998); *Osman v. the United Kingdom*, App. Nos. 87/1997/871/1083, ¶ 115 (Eur. Ct. H.R., Oct. 28, 1998); *Pueblo Bello Massacre v. Colombia*, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 140, ¶ 120 (Jan. 31, 2006); Human Rights Committee, *General Comment No 6: Article 6 (Right to Life)*, ¶ 3, CCPR (Apr. 30, 1982).

⁶¹ See for instance, *Kayak v. Turkey*, App. No. 60444/08, ¶ 59 (Eur. Ct. H.R., Jul. 10, 2012) (concerning the murder of a 15 year-old child who was stabbed in front of his school); *Pueblo Bello Massacre v. Colombia*, *supra* note 60, ¶ 120 (Jan. 31, 2006) (relating to extrajudicial executions by paramilitary groups); Human Rights Committee, *General Comment No 31: The Nature of the General Legal Obligation Imposed on States Parties to the Covenant*, *supra* note 46, ¶ 8 (about State obligations under the Covenant in general and not only relating to the right to life). For the conceptual framework

and not as an obligation of result,⁶² as States cannot be subjected to an impossible or disproportionate burden while attempting to prevent deaths.⁶³ Those falling within the State's jurisdiction are entitled to the protection in the same manner as nationals.⁶⁴ In the context of the protection of migrants' right to life and the prevention of deaths at sea, Professor Goodwin-Gill argues that States have a "positive due diligence obligation to save lives".⁶⁵ The instant question is whether this duty should be carried out, when possible, by the use of new technologies relying on big data analysis.

Typically, States have a certain margin of appreciation with regard to implementing positive obligations.⁶⁶ However, the margin of appreciation and deference to domestic decisions is limited

of positive obligations and horizontal effect of international treaties on human rights, see ANDREW CLAPHAM, *HUMAN RIGHTS IN THE PRIVATE SPHERE* (1996).

⁶² Constantin P. Economides, *Content of the Obligation: Obligations of Means and Obligations of Result*, in JAMES CRAWFORD ET AL. (eds.), *THE LAW OF INTERNATIONAL RESPONSIBILITY*, 371, 372 (2010) ("obligations of means impose on a State the obligation to do the best they can in furtherance of a specific goal, but without the guarantee that this goal will be reached. By contrast, obligations of result require a State to guarantee the achievement of the prescribed result"); Jean Combacau, *Obligations de Résultat et Obligations de Comportement: Quelques Questions et Pas de Réponse*, in DANIEL BARDONNET ET AL. (eds.), *LE DROIT INTERNATIONAL: UNITÉ ET DIVERSITÉ. MÉLANGES OFFERTS À PAUL REUTER*, 181, 184-7 (1981) (for an overview of the origins of this typology of obligations in French civil law and its transposition into international law). See *Osman v. United Kingdom*, *supra* note 60, ¶ 116 (Eur. Ct. H.R., Oct. 28, 1998) ("not every claimed risk to life can entail for the authorities a Convention requirement to take operational measures to prevent that risk from materialising").

⁶³ *Osman v. the United Kingdom*, *supra* note 60, ¶ 116 (Eur. Ct. H.R., Oct. 28, 1998); *Kilic v. Turkey*, App. No. 22492/93, ¶ 63 (Eur. Ct. H.R., Mar. 28, 2000); *Opuz v. Turkey*, App. No. 33401/02, ¶ 129 (Eur. Ct. H.R., Jun. 9, 2009).

⁶⁴ See Article 1 of the ECHR providing that "[t]he High Contracting Parties shall secure to everyone within their jurisdiction the rights and freedoms defined in Section I of this Convention"; Article 1(1) ACHR providing that "[t]he States Parties to this Convention undertake to respect the rights and freedoms recognized herein and to ensure to all persons subject to their jurisdiction the free and full exercise of those rights and freedoms (...); Article 2 (1) of the ICCPR providing that "[e]ach State Party to the present Covenant undertakes to respect and to ensure to all individuals within its territory and subject to its jurisdiction the rights recognized in the present Covenant". See also Human Rights Committee, *General Comment No 15: The position of aliens under the Covenant*, *supra* note 56, ¶ 2 (affirming that "the general rule is that each one of the rights of the Covenant must be guaranteed without discrimination between citizens and aliens").

⁶⁵ Goodwin-Gill, *supra* note 23, at 25.

⁶⁶ The margin of appreciation is understood as "tool to define relations between the domestic authorities and the Court" as per *A and others v. UK*, App No. 3455/05, ¶ 184 (Eur. Ct. H.R., Feb. 19, 2009). This doctrine was developed by the ECtHR and directly relates to the principle of subsidiarity. See Protocol No. 15 amending the Convention on the Protection of Human Rights and Fundamental Freedoms, CETS No 213 (June 24, 2013). See notably, Yuval Shany, *Toward a General Margin of Appreciation Doctrine in International Law?*, 16 *EUR. J. INT'L L.* 907, 910 (2005) (explaining that the two principal elements at the basis of the doctrine are judicial deference and normative flexibility); George Letsas, *Two Concepts of the Margin of Appreciation*, 26 *OXF. J. LEG. STUD.* 705, 706 (2006) (proposing a substantive and a structural analysis of the margin of appreciation); Michael R. Hutchinson, *The Margin of Appreciation Doctrine in the European Court Of Human Rights*, 48 *INT'L & COMP. L. Q.* 638, 640 (1999) (explaining the width of the margin of appreciation in relation to existence of consensus, nature of rights and aims protected such as national security); Dominic McGoldrick, *A Defence of the Margin of Appreciation and an Argument for its Application by the Human Rights Committee*, 65 *Int'l & Comp. L. Q.* 21, 41 (2016) (discussing the non-use of the margin of appreciation doctrine by the

vis-à-vis absolute rights and the right to life.⁶⁷ Accordingly, the criterion of reasonableness becomes essential in defining the scope of the obligation to protect human rights in the context of these rights.⁶⁸ As observed by Professor Yuval Shany, international courts review the reasonableness of State measures vis-à-vis the object and purpose of the governing norm.⁶⁹ Nevertheless, as indicated by the International Court of Justice (ICJ) “what is reasonable and equitable in any given case must depend on its particular circumstances.”⁷⁰ In this regard, the circumstances of maritime migration can hardly be described other than alarming.⁷¹ Reportedly, the number of lives lost at sea in recent years is unprecedented.⁷² This is notably due to the shocking precariousness of vessels used for migrant smuggling.⁷³

Human Rights Committee and its consequences for the protection of rights provided by the ICCPR); Andreas Follesdal, *Exporting the margin of appreciation: Lessons for the Inter-American Court of Human Rights*, 15 INT'L J. CONST. L. 359, 362 (2017) (arguing that the IACtHR should consider the margin of appreciation doctrine which “duly developed and specified, can contribute to alleviating the tension between human rights protection and due deference to sovereignty in a defensible way”); Jorge Contesse, *Contestation and Deference in the Inter-American Human Rights System*, 79 LAW CONTEMP. PROBL. 123, 141 (2016) (arguing that the IACtHR referred to the margin of appreciation doctrine in several decisions, albeit inconsistently).

⁶⁷ ANDREW LEGG, *THE MARGIN OF APPRECIATION IN INTERNATIONAL HUMAN RIGHTS LAW: DEFERENCE AND PROPORTIONALITY*, 205-8 (2012) (explaining that only in limited circumstances courts can allow a margin of appreciation or a certain deference to States vis-à-vis the right to life and the prohibition of torture, inhuman and degrading treatment); STEVEN GREER, *THE MARGIN OF APPRECIATION: INTERPRETATION AND DISCRETION UNDER THE EUROPEAN CONVENTION ON HUMAN RIGHTS*, Council of Europe, Human Rights Files No. 7, 27 (2000) (analysing the lack of reference to the doctrine of margin of appreciation in ECtHR decisions relating to Articles 2, 3 and 4 of the ECHR). But see, Stephen Skinner, *Deference, proportionality and the margin of appreciation in lethal force case law under Article 2 ECHR*, 1 E. H. R. L. R. 32 (2014) (for a critical analysis of the use of the margin of appreciation in the context of the ECtHR decisions relating to the use of lethal force by States).

⁶⁸ OLIVIER DE SCHUTTER, *INTERNATIONAL HUMAN RIGHTS LAW* 462 (2d ed. 2014).

⁶⁹ Shany, *supra* note 66, at 910.

⁷⁰ Interpretation of the Agreement of 25 March 1951 between the WHO and Egypt, Advisory Opinion, 1980 I.C.J. 96, ¶ 49 (Dec. 20).

⁷¹ For the academic discussion of contemporary maritime migration, see VIOLETA MORENO-LAX & EFTHYMOS PAPANASTAVRIDIS (eds.), *'BOAT REFUGEES' AND MIGRANTS AT SEA: A COMPREHENSIVE APPROACH: INTEGRATING MARITIME SECURITY WITH HUMAN RIGHTS* (2016); ITAMAR MANN, *HUMANITY AT SEA. MARITIME MIGRATION AND THE FOUNDATIONS OF INTERNATIONAL LAW* (2017); VIOLETA MORENO-LAX, *ACCESSING ASYLUM IN EUROPE*, *supra* note 20 (chapter 6). For a historical perspective on maritime migration into Australia, see CLAIRE HIGGINS, *ASYLUM BY BOAT: ORIGINS OF AUSTRALIA'S REFUGEE POLICY* (2017).

⁷² See notably, UNGA, *New York Declaration for Refugees and Migrants*, A/RES/71/1 (October 3, 2016) ¶ 28 (expressing profound concerns about “the large number of people who have lost their lives in transit”); European Political Strategy Centre, *Irregular Migration via the Central Mediterranean. From Emergency Responses to Systemic Solutions*, European Commission EPSC Strategic Notes, at 1, available at https://ec.europa.eu/commission/sites/beta-political/files/irregular-migration-mediterranean-strategic_note_issue_22_0_en.pdf (estimating that more than 13,000 lives were lost in the Central Mediterranean between 2011 and 2016); International Organisation for Migration [hereinafter “IOM”], *Missing Migrants*, available at <https://missingmigrants.iom.int/> (a database of the IOM project tracking the deaths of migrants worldwide).

⁷³ European Political Strategy Centre, *supra* note 72, at 7 (estimating that 70% of vessels are made of rubber and unfit for sail).

Analysis of data generated by migrants and asylum-seekers (e.g. mobile applications recording geolocation, online searches, phone calls) can contribute to identifying their movement patterns.⁷⁴ Moreover, data from other sources such as the Automatic Identification System (AIS)⁷⁵ and the Broadcast Warning System⁷⁶ can also be used for search and rescue of migrants in distress at sea, as demonstrated by an International Organisation for Migration (IOM) study in 2017.⁷⁷ Data from all these sources could be useful for the identification of vulnerable groups of migrants at risk of dying in vessels unfit for sail at sea. Yet, should States be expected, and therefore required, to use such technologies to prevent migrant deaths at sea?

An analogy with disaster prevention may be useful in this respect. Pursuant to Article 9 of the International Law Commission (ILC)'s Draft Articles on the Protection of Persons in the Event of Disasters, States shall reduce the risk of disasters by taking appropriate measures including risk assessments for the prevention, mitigation and preparation for disasters.⁷⁸ Similarly, the ECtHR identified an obligation to prevent and mitigate disasters within the scope of Article 2 of the ECHR.⁷⁹ Acknowledging the ECtHR's jurisprudence in this area, the Special Rapporteur Valencia-Ospina emphasized that "a State therefore incurs liability when it neglects its duty to take

⁷⁴ See *supra* note 31.

⁷⁵ An automated tracking system fitted in ships which can provide real time information to other ships and to coastal authorities. Regulation 19 (2.4) of the SOLAS (requesting that ships of more than 500 tonnes or operating internationally should be fitted with the automatic identification system [hereinafter AIS]). That would include vessels operating search and rescue missions at sea. See IOM, *Fatal Journeys. Improving Data on Missing Migrants*, 28 (2017) available at http://publications.iom.int/system/files/pdf/fatal_journeys_volume_3_part_1.pdf (explaining how AIS data can be captured and used).

⁷⁶ Broadcast warnings are disseminated by the Worldwide Navigational Warning Service (WWNWS). This is a broadcast system based on radio and satellite technology and used for maritime safety. See National Geospatial Intelligence Agency, available at http://msi.nga.mil/NGAPortal/MSI.portal?_nfpb=true&_pageLabel=msi_wwnws (for general information about the WWNWS); IOM, *Fatal Journeys*, *supra* note 75, at 29 (for an explanation of how the WWNWS data can be used in the context of international migration).

⁷⁷ IOM, *Fatal Journeys*, *supra* note 75, at 25-42 (demonstrating how these two data sources can be used for the purposes of studying rescue patterns in the Mediterranean).

⁷⁸ Article 9 (1) and (2) of the ILC, Draft Articles on the Protection of Persons in the Event of Disasters, UN A/71/10 (2016).

⁷⁹ See *Budayeva and others v. Russia*, App Nos. 15339/02, 21166/02, 20058/02, 11673/02 and 15343/02, ¶ 132 (Eur. Ct. H.R., Mar. 20, 2008) (about recurrent and deadly mudslides) ("[a]s regards the substantive aspect, in the particular context of dangerous activities the Court has found that special emphasis must be placed on regulations geared to the special features of the activity in question, particularly with regard to the level of the potential risk to human lives. (...) The relevant regulations must also provide for appropriate procedures, taking into account the technical aspects of the activity in question, for identifying shortcomings in the processes concerned and any errors committed by those responsible at different levels"); *Öneryıldız v. Turkey*, App No. 48939/99, ¶ 89 (Eur. Ct. H.R., Nov. 30, 2004) (about a methane explosion in a slum near Istanbul and the consequent death of nine individuals) ("this positive obligation entails above all a primary duty on the State to put in place a legislative and administrative framework designed to provide effective deterrence against threats to the right to life").

preventive measures when a natural hazard is clearly identifiable and effective means to mitigate the risk are available to it.”⁸⁰ Identification of natural disasters is nowadays for a large part dependent on satellite imagery and computerised technologies.⁸¹ Furthermore, Article 3 of the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations expressly encourages States to deploy satellite telecommunication equipment to predict, monitor and provide information concerning natural hazards, health hazards and disasters.⁸² Arguably, when State authorities have the capabilities to use satellite imagery and computerised new technologies to foresee a natural disaster such as an earthquake or a tsunami, it is reasonable to believe that they must do so in order to prepare for it as efficiently as possible and to prevent losses of lives and damage to individuals and property within their jurisdiction.⁸³ The use of these technologies can be a useful means for the prevention of damage and for the delivery of technical assistance during such disasters.⁸⁴ Accordingly, it is possible to argue that a State would have a duty to use such technologies if this was within its technical capabilities and if this was the most effective way to prepare for, prevent, and mitigate natural disasters.

A similar argument could be made in relation to the use of new technologies based on big data as means of preventing migrant deaths at sea. Arguably, States have a duty to use new technological means to prevent migrants’ deaths at sea if and when: (1) States have the technical capability to do so as evidenced by the use of these new technological means in a related field; (2)

⁸⁰ Sixth report of the Special Rapporteur, Mr. Eduardo Valencia-Ospina (65th session of the ILC (2013)) ¶ 53.

⁸¹ See notably, Charter on Cooperation to Achieve the Coordinated Use of Space Facilities in the Event of Natural or Technological Disasters, Article 2, Rev.3 (25/4/2000) 2 (affirming that one of its objectives is to “supply during periods of crisis, to States or communities whose population, activities or property are exposed to an imminent risk, or are already victims, of natural or technological disasters, data providing a basis for critical information for the anticipation and management of potential crises”); United Nations Platform for Space-based Information for Disaster Management and Emergency Response (UN-SPIDER) available at <http://www.un-spider.org/space-application/satellite-technology> (explaining the types of services that satellites can provide for disaster risk management and emergency response); Thomas W. Gillespie et al., *Assessment and Prediction of Natural Hazards from Satellite Imagery*, 31 *PROG. PHYS. GEOGR.* 459, 459 (2007) (explaining that “since 2000, there have been a number of spaceborne satellites that have changed the way we assess and predict natural hazards”)

⁸² Article 3 (2) (a) of the Tampere Convention on the Provision of Telecommunication Resources for Disaster Mitigation and Relief Operations, Jun. 18, 1998, 2296 U.N.T.S. 5.

⁸³ Sixth report of the Special Rapporteur, Mr. Eduardo Valencia-Ospina, *supra* note 80, ¶ 53 (“a State’s duty is triggered when a disaster becomes foreseeable, which mirrors the foreseeability requirement within the principle of due diligence”).

⁸⁴ See Eighth report of the Special Rapporteur, Mr. Eduardo Valencia-Ospina (68th session of the ILC (2016)) ¶ 168 (recalling that the European Union recommended that a specific mention should be made in the commentary of the ILC’s Draft Articles on the Protection of Persons in the Event of Disasters according to which satellite imagery can be used as an important means of delivering technical assistance during emergency response).

the use of such technologies does not amount to an impossible or disproportionate burden on them; and (3) it is reasonable to believe that the use of these means is the most effective way to fulfil the obligation.

Firstly, it is submitted that States which already use such technologies may have the technical capability to transform them into tools for the much-needed protection of migrants' lives at sea. This is illustrated, for instance, by the fact that big data has been increasingly used by States for surveillance purposes, as in the case of bulk surveillance techniques used by many States, from Europe to the Americas.⁸⁵ In this regard, developing States may not be capable of employing such technologies until the digital divide between developing and developed world has been bridged, or until a stronger international cooperation for technical matters has been established.⁸⁶

Secondly, it is accepted that States are not expected to bear an impossible or disproportionate burden while complying with their positive obligations.⁸⁷ In this regard, the ECtHR emphasizes that State authorities will be deemed to have violated a positive obligation only if they 'knew or

⁸⁵ See UNGA Resolution 68/167, *The Right to Privacy in the Digital Age*, A/RES/68/167, ¶ 25 (Jan. 21, 2014) (affirming that "[m]ass or 'bulk' surveillance programmes may thus be deemed to be arbitrary, even if they serve a legitimate aim and have been adopted on the basis of an accessible legal regime"). See also *Roman Zakharov v. Russia*, App No. 47143/06, ¶ 160 (Eur. Ct. H.R., Dec. 4, 2015) (about blanket interception of mobile phone communications data); *Szabó and Vissy v. Hungary*, App No. 37138/14, ¶ 73 (Eur. Ct. H.R., Jan. 12, 2016) (assessing the use of cutting-edge surveillance technologies by Hungarian authorities); *Escher et al. v. Brazil*, Preliminary Objections, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H. R. (ser. C) No. 200, ¶¶ 114-5 (Jul. 6, 2009) (on surveillance by State authorities via new technological tools). See also the pending cases before the ECtHR: *Big Brother Watch and Others v. the United Kingdom*, App No. 58170/13, *Bureau of Investigative Journalism and Alice Ross v. the United Kingdom* App No. 62322/14; *Human Rights Organisations and Others v. the United Kingdom*, App No. 24960/15 (all three relating to the bulk interception of external communications by the UK authorities and the sharing of information between UK and US authorities). See also Hilde Bos-Ollermann, *Mass Surveillance and Oversight*, in DAVID D. COLE ET AL. (eds.) *SURVEILLANCE, PRIVACY AND TRANSATLANTIC RELATIONS* (2017) 139, 140 (discussing the State practice of 'bulk collection' of untargeted data in mass surveillance technics); David Lyon, *Surveillance, Snowden, and Big Data: Capacities, Consequences, Critique*, *BIG DATA & SOC'Y* 1, 5 (2014) (affirming that big data "intensify surveillance by expanding interconnected datasets and analytical tools").

⁸⁶ See PIPPA NORRIS, *DIGITAL DIVIDE: CIVIC ENGAGEMENT, INFORMATION POVERTY AND THE INTERNET WORLDWIDE*, 4-9 (2001) (on the global divide amongst countries). See also Article 26 of the ACHR ("[t]he States Parties undertake to adopt measures, both internally and through international cooperation, especially those of an economic and technical nature, with a view to achieving progressively, by legislation or other appropriate means, the full realization of the rights implicit in the economic, social, educational, scientific, and cultural standards set forth in the Charter of the Organization of American States as amended by the Protocol of Buenos Aires"). See *mutatis mutandis* Rio Declaration on Environment and Development, UN Doc. A/CONF.151/26 (vol. I); 31 ILM 874 (1992), Principle 7 ("[i]n view of the different contributions to global environmental degradation, States have common but differentiated responsibilities"); Virginie Barral, *Sustainable Development in International Law: Nature and Operation of an Evolutive Legal Norm*, 23 *Eur. J. Int'l L.* 377, 381-2 (2012) (for an analysis of the principle of common but differentiated responsibilities in the field of international environmental protection).

⁸⁷ *Osman v. United Kingdom*, *supra* note 60, ¶ 116 (Eur. Ct. H.R., Oct. 28, 1998); *Kilic v. Turkey*, *supra* note 63, ¶ 63; *Opuz v. Turkey*, *supra* note 63, ¶ 129 (Eur. Ct. H.R., Jun. 9, 2009).

ought to have known at the time of the existence of a real and immediate risk to the life of an identified individual or individuals ... and [if] they failed to take measures within the scope of their powers which, judged reasonably, might have been expected to avoid that risk'.⁸⁸ The IACtHR has adopted similar criteria.⁸⁹ However, UN agencies, NGOs, charities and private service providers operating in the field regularly assess the situation on the ground and inform State authorities about the existence of real risks to migrants' lives.⁹⁰ For instance, the UNHCR provided evidence that the risk to migrants' lives is heightened on certain maritime routes, such as the Central Mediterranean route from North Africa to Italy.⁹¹ It is submitted that State authorities can acquire sufficient knowledge about the existence of a real risk to migrants' lives in specific migratory routes where individuals are smuggled in vessels unfit for sail. Once they have the knowledge of the risk, State authorities are required to act, adopting measures to prevent migrant deaths at sea. New technologies based on big data analysis (e.g. analysis of mobile applications recording geolocation, online searches, phone calls, AIS data and Broadcast Warning System data) should, if available, figure amongst these measures.⁹²

⁸⁸ *Osman v. the United Kingdom*, *supra* note 60, ¶ 116.

⁸⁹ See notably *Velásquez Rodríguez v. Honduras*, Preliminary Objections, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 1, ¶¶ 174-5 (Jun. 26, 1987); *Sawhoyamaya Indigenous Community v. Paraguay*, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 146, ¶ 155 (Mar. 29, 2006); *Pueblo Bello Massacre v. Colombia*, *supra* note 60, ¶ 123; *Valle Jaramillo et al. v. Colombia*, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 192, ¶ 78 (Nov. 27, 2008).

⁹⁰ See IOM, *Dangerous journeys. International migration increasingly unsafe in 2016*, Global Migration Data Analysis Centre, Data Briefing Series no. 4, 2 (Aug. 2016) available at https://publications.iom.int/system/files/gmdac_data_briefing_series_issue4.pdf (for the recorded numbers of migrant deaths and disappearances by region between January and June 2016); Doctors Without Borders, *Mediterranean: Nearly 600 people rescued but unknown number missing presumed drowned* (Nov. 3, 2017) available at <http://www.msf.org/en/article/mediterranean-nearly-600-people-rescued-unknown-number-missing-presumed-drowned> (explaining that "once at sea on a flimsy and overcrowded inflatable dinghy, all are vulnerable and need to be rescued and brought to safety. Many people cannot swim and most do not have life jackets with them. It is an imminent life and death situation and the risk of drowning is always present"). See also, Watch the Mediterranean, available at <http://watchthemed.net/index.php/main> (an online mapping platform that monitors real time maritime migration in the Mediterranean sea); Vessel Finder, available at <https://www.vesselfinder.com> (a vessel tracking service provider using AIS data); Maritime Traffic, available at <http://www.marinetraffic.com/> (a private service provider using AIS data to monitor maritime traffic);

⁹¹ The UNHCR provides information about the situation in the Mediterranean via its data portal available at <https://data2.unhcr.org/en/situations/mediterranean>. See also UNHCR, *Dead and missing at sea* (Nov. 16, 2017) available at <https://data2.unhcr.org/en/documents/download/60779>; UNHCR, *Desperate Journeys. Refugees and Migrants Entering and Crossing Europe via the Mediterranean and Western Balkan Routes*, 6-7 (Feb., 2017) available at <http://www.unhcr.org/58b449f54> ("[t]he number of deaths of refugees and migrants in the Mediterranean as they attempted to reach Europe in 2016 is the highest on record, primarily due to 4,578 deaths in the central Mediterranean, compared to 2,913 in the whole of 2015").

⁹² See *supra* notes 74-7 and accompanying text.

Thirdly, the principle of effectiveness entails that the parties to a treaty have intended it “to have a certain effect, and not to be meaningless.”⁹³ As Professor Hugh Thirlway has noted, “an interpretation which would make the text ineffective to achieve the object in view is, again, *prima facie* suspect.”⁹⁴ The ECtHR and the IACtHR have interpreted the right to life as encompassing a positive obligation for a State to “take appropriate steps to safeguard the lives of those within its jurisdiction”⁹⁵ in order for that right to be effective.⁹⁶ If the use of new technologies based on big data analysis becomes a feasible way to identify individuals whose lives are at risk at sea, as this is the case with the use of satellite imagery for the prevention and mitigation of natural disasters, not using such technologies would deplete the obligation of its effect.⁹⁷ In other words, failure to use feasible technologies would amount to unnecessary loss of lives, emptying the obligation under the right to life of effectiveness.

The following example could be used for illustrative purposes. Arguably, Italy and the European Border and Coast Guard Agency (Frontex),⁹⁸ had access to sufficiently clear information provided by the UNHCR that a precise maritime route (e.g. the Central Mediterranean route) had

⁹³ ROBERT JENNINGS & ARTHUR WATTS (eds.), *OPPENHEIM’S INTERNATIONAL LAW*, 1280 (9th ed, vol I, 1992).

⁹⁴ Hugh Thirlway, *The Law and Procedure of the International Court of Justice 1960–1989: Part Three*, 62 *BYIL* 1, 44 (1991).

⁹⁵ *Osman v. United Kingdom*, *supra* note 60, ¶ 115.

⁹⁶ *Id.*, ¶ 116; *Pueblo Bello Massacre v. Colombia*, *supra* note 60, ¶ 111. See also Human Rights Committee, *General Comment No 31: The Nature of the General Legal Obligation Imposed on States Parties to the Covenant*, *supra* note 46, ¶ 6 (on the “continuous and effective protection of Covenant rights”).

⁹⁷ See *supra* notes 81-4 and accompanying text (on the use of satellite imagery). Comparatively, see on the concept of feasibility as applied in International Humanitarian Law: Article 57 (2) a) ii of the Protocol Additional to the Geneva Conventions of 12 August 1949, and Relating to the Protection of Victims of International Armed Conflicts, June 8, 1977, 1125 U.N.T.S. 3 (“those who plan or decide upon an attack shall: ... take all feasible precautions in the choice of means and methods of attack with a view to avoiding, and in any event to minimizing, incidental loss of civilian life, injury to civilians and damage to civilian objects”); INT’L COMM. OF THE RED CROSS (ICRC), *CUSTOMARY INTERNATIONAL HUMANITARIAN LAW* 56, Rule 17 (Jean-Marie Henckaerts & Louise Doswald-Beck eds., 2005) (“[e]ach party to the conflict must take all feasible precautions in the choice of means and methods of warfare with a view to avoiding, and in any event to minimising, incidental loss of civilian life, injury to civilians and damage to civilian objects”); MICHAEL N. SCHMITT, *TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS*, 479 commentary under Rule 115 (2017) (“‘[f]easible’ has been widely interpreted as that which is ‘practicable or practically possible, taking into account all circumstances ruling at the time, including humanitarian and military considerations’”); Michael N. Schmitt & John J. Merriam, *The Tyranny of Context: Israeli Targeting Practices in Legal Perspective*, 37 *U. PA. J. INT’L L.* 53, 133 (“[i]n some cases, feasibility may be an issue of asset availability” – which could relate for example to advanced technologies).

⁹⁸ European Parliament and Council Regulation (EU) 2016/1624, *supra* note 20 (establishing the Frontex). This regulation replaces the former European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union and repeals the former Council Regulation (EC) 2007/2004, 2004 O.J. (L 349) 1. See notably, MORENO-LAX, *ACCESSING ASYLUM IN EUROPE*, *supra* note 20, at 155-80 (for a comprehensive overview of Frontex’s origins, development, structure, tasks and powers); Efthymios Papastavridis, *Fortress Europe’ and FRONTEX*, *supra* note 20, at 75 (2010) (for an analysis of Frontex operations in light of the International Law of the Sea).

been consistently deadly in the past months.⁹⁹ However, extensive search and rescue operations had been ruled out, as they were controversially deemed to increase the number of migrant smuggling attempts.¹⁰⁰ Consequently, this may have led in practice, to a larger number of migrant deaths in this maritime route.¹⁰¹ Yet, big data analysis could have been useful to predict and map migratory paths in near real-time.¹⁰² Frontex already performs risk analysis and has a dedicated data science team to carry out big data analytics.¹⁰³ Italy, may have already the capability to conduct big data analysis, notably as its authorities seem to use such technology for mass surveillance operations.¹⁰⁴ Moreover, Frontex can provide technical assistance to EU Member States and could in theory assist Italian authorities with data science support.¹⁰⁵ Therefore, Italy could potentially use big data analysis to inform targeted search and rescue operations in this specific maritime route if they had sufficient knowledge about the existence of real risks to migrants' lives entering their jurisdiction. Such operations could contribute to prevent unnecessary migrant deaths. If such targeted operations were considered as more effective than non-targeted operations, recourse to new technologies based on big data would be required.

⁹⁹ See *supra* note 91.

¹⁰⁰ The Italian operation *Mare Nostrum* was discontinued in October 2014 and was followed by the Frontex-led operation Triton. In parallel, the so called 'EU NavFor/Sophia' operations were launched in June 2015 with a specific anti-smuggling mission. See European Political Strategy Centre, *supra* note 72, at 3 (for a detailed overview of the different operations in the Central Mediterranean route); MORENO-LAX, ACCESSING ASYLUM IN EUROPE, *supra* note 20, at 195 ("in October 2014 Mare Nostrum was terminated on account of excessive costs—and perhaps due to a perceived 'call effect' attracting continuous arrivals. Frontex operation Triton took over, but with a much less ambitious remit").

¹⁰¹ See UNHCR, *Dead and missing at sea*, *supra* note 91 (for the number of deaths in the central Mediterranean route since 2015).

¹⁰² See Pew Research Centre, *The Digital Footprint of Europe's Refugees*, *supra* note 31, fig. 1; IOM, *Fatal Journeys*, *supra* note 75, at 29; Facebook Data Science, Coordinated Migration available at https://www.facebook.com/notes/facebook-data-science/coordinated-migration/10151930946453859?notif_t=notify_me (mapping migration by contrasting Facebook users' data about their declared "hometown" and their declared "current city").

¹⁰³ See *supra* note 24. See also <http://frontex.europa.eu/intelligence/analytics/> (explaining that "[t]he Analytics Sector was established to expand the Risk Analysis Unit's data and geo analysis capabilities and to sustain the high quality level of knowledge delivered and managed by it. The sector consists of two teams supporting the Strategic and Operational Sectors in their ad-hoc and bespoke exploitation of data and intelligence (Data Team) and through the provision and development of geospatial services (GIS Team)").

¹⁰⁴ See Disegno di legge S. 2886, Disposizioni per l'adempimento degli obblighi derivanti dall'appartenenza dell'Italia all'Unione europea - Legge europea 2017, A.C. 4505-B, art. 24 (allowing the use of mass surveillance in the fight of terrorism).

¹⁰⁵ Article 8 (1) (f) of the Regulation (EU) 2016/1624, *supra* note 20 ("provide technical and operational assistance to Member States and third countries in accordance with Regulation (EU) No 656/2014 and international law, in support of search and rescue operations for persons in distress at sea which may arise during border surveillance operations at sea").

Accordingly, if new technologies based on big data were the most effective tools for the prevention of migrants' deaths, and their use did not impose any impossible or disproportionate burden on States that have the technical capabilities to operate them, it is submitted that, due to the particular circumstances of maritime migration, it is reasonable to expect those States to use such technologies in order to fulfil their positive obligation. The next section examines whether the same approach could also be applied in relation to the protection of migrants at risk of ill-treatment and human trafficking.

C. *Protection of Migrants at Risk of Ill-Treatment and Human Trafficking*

Migrants and asylum-seekers in large migratory movements are particularly vulnerable to abuse, human trafficking and exploitation.¹⁰⁶ This is especially concerning in relation to migrant and asylum-seeking children.¹⁰⁷ According to the UNICEF and the IOM, 77% of migrant and asylum-seeking children travelling in the Mediterranean region have reported experiencing abuse, exploitation, and practices that may amount to ill-treatment and human trafficking.¹⁰⁸

Torture, inhuman and degrading treatment or punishment are forms of ill-treatment which human rights treaties prohibit and condemn.¹⁰⁹ Defined criteria allow for the identification of

¹⁰⁶ See notably United Nations Office on Drugs and Crime (UNODC), *Global Report on Trafficking in Persons 2016* (Dec., 2016) 10, available at http://www.unodc.org/documents/data-and-analysis/glotip/2016_Global_Report_on_Trafficking_in_Persons.pdf (emphasising that conflicts create favourable conditions for trafficking in person and that migrants and refugees are “easily targeted by traffickers”); UNGA, New York Declaration for Refugees and Migrants, *supra* note 72, ¶ 35 (recognising that “refugees and migrants in large movements are at greater risk of being trafficked and of being subjected to forced labour”); IOM, *Abuse, Exploitation and Trafficking: IOM reveals data on the scale of the danger and risks that migrants face on the Mediterranean routes to Europe* (Oct. 18, 2016) available at <http://unitedkingdom.iom.int/abuse-exploitation-and-trafficking-iom-reveals-data-scale-danger-and-risks-migrants-face>.

¹⁰⁷ The term ‘children’ is defined in Article 1 of the Convention on the Rights of the Child, Nov. 20, 1989 1577 U.N.T.S. 3 (“For the purposes of the present Convention, a child means every human being below the age of eighteen years unless under the law applicable to the child, majority is attained earlier”).

¹⁰⁸ IOM & UNICEF, *Harrowing Journeys. Children and youth on the move across the Mediterranean Sea, at risk of trafficking and exploitation* (Sep., 2017) 8, available at https://www.iom.int/sites/default/files/press_release/file/Harrowing_Journeys_Children_and_youth_on_the_move_across_the_Mediterranean.pdf.

¹⁰⁹ See notably Articles 7 of the ICCPR, 3 of the ECHR, 5 of the ACHR, and also Article 2 of Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment, Dec. 10, 1984, 1465 U.N.T.S. 85 [hereinafter “CAT”].

situations falling within the scope of each of these types of ill-treatment.¹¹⁰ The protection afforded by these instruments applies to all individuals within the jurisdiction of the State parties to the treaties, including foreigners.¹¹¹

Human trafficking is defined by Article 3 (a) of the Palermo Protocol and Article 4 (a) of the Anti-Trafficking Convention.¹¹² According to both identically worded provisions, trafficking in persons

shall mean the recruitment, transportation, transfer, harbouring or receipt of persons, by means of the threat or use of force or other forms of coercion, of abduction, of fraud, of deception, of the abuse of power or of a position of vulnerability or of the giving or receiving of payments or benefits to achieve the consent of a person having control over another person, for the purpose of exploitation. Exploitation shall include, at a minimum, the exploitation of the prostitution of others or other forms of sexual exploitation, forced labour or services, slavery or practices similar to slavery, servitude or the removal of organs.

It is generally accepted that States are required to adopt measures to ensure that individuals within their jurisdiction are not subjected to ill-treatment, even if such treatments are administered by private individuals.¹¹³ Likewise, the ECtHR recognised that States have the positive obligation

¹¹⁰ See notably Article 1 of the CAT; *Ireland v. United Kingdom*, App No. 5310/71, ¶ 167 (Eur. Ct. H.R., Jan. 18, 1978); *Tyrer v. United Kingdom*, App No. 5856/72, ¶ 30 (Eur. Ct. H.R., Apr. 25, 1978); *Soering v. United Kingdom*, *supra* note 14, ¶ 100; *Selmouni v. France*, App No. 25803/94, ¶ 96 (Eur. Ct. H.R., Jul. 28, 1999); *Tibi v. Ecuador*, Judgment of September 7, 2004, IACtHR, (Series C) No. 114, ¶¶ 145-6;

¹¹¹ See Human Rights Committee, *General Comment No 15: The position of aliens under the Covenant*, *supra* note 56, ¶ 7 (affirming that aliens “must not be subjected to torture or to cruel, inhuman or degrading treatment or punishment”); *Chahal v. The United Kingdom*, App No. 22414/93, ¶¶ 73-4 (Eur. Ct. H.R., Nov. 15, 1996) (on the applicability of Article 3 ECHR to aliens in expulsion cases); *Rights and Guarantees of Children in the Context of Migration and/or in need of International Protection*, Advisory Opinion OC-21/14, *supra* note 46, ¶ 225 (Aug. 19, 2014) (on the relationship between the prohibition of torture, inhuman and degrading treatment and the principle on non-refoulement).

¹¹² Protocol to Prevent, Suppress and Punish Trafficking in Persons Especially Women and Children, supplementing the United Nations Convention against Transnational Organized Crime, art. 3(a) (Nov. 15, 2000) UN Doc. A/55/383 [hereinafter “Palermo Protocol”]; Council of Europe Convention on Action Against Trafficking in Human Beings, art. 4(a) (May 16, 2005) C.E.T.S. 197 [hereinafter “Anti-Trafficking Convention”].

¹¹³ See notably *A. v. United Kingdom*, App. Nos. 100/1997/884/1096, ¶ 22 (Eur. Ct. H.R., Sept. 23, 1998). Confirmed thereafter by the ECtHR. See notably *Z. and others v. United Kingdom*, App. No. 29392/95, ¶ 73 (Eur. Ct. H.R., May 10, 2001); *Opuz v. Turkey*, *supra* note 63, ¶ 159; *Đurđević v. Croatia*, App. No. 52442/09, ¶ 102 (Eur. Ct. H.R., Jul. 19, 2011); *Begheluri and others v. Georgia*, App. No. 28490/02, ¶ 97 (Eur. Ct. H.R., Oct. 7, 2014). See also *Velásquez Rodríguez v. Honduras*, *supra* note 89, ¶¶ 174-5; Human Rights Committee, *General Comment No 31: The Nature of the General Legal Obligation Imposed on States Parties to the Covenant*, *supra* note 46, ¶ 8 (about State obligations under the ICCPR).

to adopt operational measures to protect victims, or potential victims, of trafficking.¹¹⁴ The IACtHR has also imposed positive obligations on States with the view to ensure respect for Article 6 of the American Convention on Human Rights (ACHR).¹¹⁵ Amongst these obligations, the IACtHR emphasised the positive obligation to adopt preventive measures vis-à-vis defined groups of people at risk of falling into slavery and human trafficking.¹¹⁶

The same analytical framework proposed above¹¹⁷ can be used to verify whether State positive measures to protect migrants against ill-treatment and human trafficking should also encompass the use of new technologies building on big data analysis. It is certainly not possible to generally infer that States have an all-encompassing duty to use new technological means to protect individuals from ill-treatment and human trafficking. However, States may have a duty to use new technological means in specific circumstances.¹¹⁸

As discussed in the previous section, a growing number of States have mass surveillance programmes drawing upon big data already in place, demonstrating their capability to use such technological tools.¹¹⁹ Yet, State authorities enjoy some discretion as to the types of measures adopted within the scope of their powers to fulfil their obligations,¹²⁰ notably when they are

¹¹⁴ Curiously, Article 4 of the ECHR does not expressly refer to human trafficking. However, using evolutive interpretation, the ECtHR considered that human trafficking, as defined by the Palermo Protocol and the Anti-Trafficking Convention, fell within the scope of Article 4 of the ECHR. See *Rantsev v. Cyprus and Russia*, App. No. 25965/04, ¶ 286 (Eur. Ct. H.R., Jan. 7, 2010); *C.N. v. United Kingdom*, App. No. 4239/08, ¶ 67 (Eur. Ct. H.R., Nov. 13, 2012); *M. and Others v. Italy and Bulgaria*, App. No. 40020/03, ¶ 151 (Eur. Ct. H.R., Jul. 31, 2012).

¹¹⁵ *Fazenda Brasil Verde Workers v. Brasil*, *supra* note 14, ¶¶ 319-20 (Oct. 20, 2016). Noteworthy, Article 6 of the ACHR, unlike Article 4 of the ECHR, explicitly refers to slave trade and traffic in women. Art 6 (1) of the ACHR (“[n]o one shall be subject to slavery or to involuntary servitude, which are prohibited in all their forms, as are the slave trade and traffic in women”); art 4 (1) of the ECHR (“[n]o one shall be held in slavery or servitude”).

¹¹⁶ *Fazenda Brasil Verde Workers v. Brasil*, *supra* note 14, ¶ 320 (also recognising that this obligation is reinforced by the imperative character of the peremptory norm of international law prohibiting slavery and the severity and intensity of the violation of rights); *Rights and Guarantees of Children in the Context of Migration and/or in need of International Protection*, Advisory Opinion OC-21/14, *supra* note 46, ¶ 92 (imposing the obligation upon States to adopt specific border control measures in order to prevent, detect, and prosecute any type of trafficking of persons).

¹¹⁷ See *supra* Section III, B.

¹¹⁸ *Id.* (for the three criteria proposed above — State capability, no impossible or disproportionate burden, and effectivity of the measure adopted).

¹¹⁹ See *supra* notes 85 and 104.

¹²⁰ See Paolo G. Carozza, *Subsidiarity as a Structural Principle of International Human Rights Law*, 97 AM. J. INT’L L. 38, 62-3 (2003) (affirming that “the institutional supervision and enforcement of international human rights law is notable mostly for the extent that it still relies so heavily on states’ discretion regarding the degree and manner of implementation of human rights domestically”); Samantha Besson, *Subsidiarity in International Human Rights Law—What is Subsidiary about Human Rights?*, 61 AM. J. JURIS. 69, 84 (2016) (discussing “the protection of the discretion of States in specifying and implementing human rights duties in their local circumstances”); Nino Tsereteli, *Emerging doctrine of deference of the Inter-American Court of Human Rights?*, 20 I. J. H. R. 1097, 1102 (2016) (discussing the IACtHR willingness

obligations of conduct or means.¹²¹ Moreover, State responsibility can be engaged only when the legal framework fails to adequately protect the individuals,¹²² or when the authorities have failed to take reasonable steps to prevent ill-treatment whereas they knew or ought to have known about the specific risks.¹²³ Knowledge of the risk may be more difficult to establish in this context than that of migrants at sea, where States are regularly warned about the risks of death in specific migratory routes.¹²⁴ By contrast, instances of human trafficking and ill-treatment of migrants are less well reported.¹²⁵

However, as protection is strongly intertwined with fighting criminality, States may have a strong interest in using new technologies. Arguably, big data analysis and in particular predictive analytics techniques could become a fundamental asset for the effective fight against criminality in relation to ill-treatment and human trafficking.¹²⁶ Such technologies could be used to identify and map areas at risk where human trafficking and ill-treatment may be taking place within the State territory.¹²⁷ For instance, human traffickers use mobile phones and the Internet for recruitment,

to allow for more deference to domestic authorities in the norm application as opposed to less or inexistent room for deference in norm interpretation).

¹²¹ See *supra* note 62.

¹²² *A. v. United Kingdom*, *supra* note 113, ¶ 24.

¹²³ *Mahmut Kaya v. Turkey*, App. No. 22535/93, ¶ 115 (Eur. Ct. H.R., Mar. 28, 2000); *Đurđević v. Croatia*, *supra* note 113 ¶ 138; *El-Masri v. the former Yugoslav Republic of Macedonia*, App. No. 39630/09, ¶ 198 (Eur. Ct. H.R., Dec. 13, 2012). See also *Opuz v. Turkey*, *supra* note 63, ¶ 159 (Eur. Ct. H.R., Jun. 9, 2009); *Rantsev v. Cyprus and Russia*, *supra* note 114, ¶ 286; *Pueblo Bello Massacre v. Colombia*, *supra* note 60, ¶ 123 (Jan. 31, 2006); *Valle Jaramillo et al. v. Colombia*, *supra* note 89, ¶ 78; *Ríos et al. v. Venezuela*, Preliminary Objections, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H.R. (ser. C) No. 194, ¶ 110 (Jan. 28, 2009); *Fazenda Brasil Verde Workers v. Brasil*, *supra* note 14, ¶ 323.

¹²⁴ See *supra* notes 90-1.

¹²⁵ But see, IOM & UNICEF, *supra* note 108 at 16 (affirming however that “those [children] whose journeys take them along the Central Mediterranean route are at substantially higher risk [of trafficking]”).

¹²⁶ See notably Artur Dubrawski et al., *Leveraging Publicly Available Data to Discern Patterns of Human-Trafficking Activity*, 1 *JOURNAL OF HUMAN TRAFFICKING*, 65, 85 (2015) (affirming that “the publicly available information can be used as an effective, relevant, timely, constant, and inexpensive proxy source of evidence that can be leveraged to enhance quantitative analysis of the problem”); Julia Muraszkiwicz, *Alternative Ways to Address Human Trafficking: Technology and Human Trafficking*, in SERGIO CARRERA & ELSPETH GUILD (eds.), *IRREGULAR MIGRATION, TRAFFICKING AND SMUGGLING OF HUMAN BEINGS. POLICY DILEMMAS IN THE EU*, Centre for European Policy Studies (2016) 87 (for a general discussion about the uses of technology for combatting human trafficking).

¹²⁷ See notably Renata A. Konrad et al., *Overcoming human trafficking via operations research and analytics: Opportunities for methods, models, and applications*, 259 *EUROPEAN JOURNAL OF OPERATIONAL RESEARCH* 733, 741 (2017) (“OR [operational research] and similar analytical techniques have a unique potential to have a powerful effect in efforts against human trafficking”); Kena Fedorschak et al., *Data Analytics and Human Trafficking*, 8463 *DESRIST 2014 LNCS* 69, 69 (2014) available at https://link.springer.com/chapter/10.1007/978-3-319-06701-8_5 (affirming that data analytics can be useful to elucidate trends in complex social data and inform future policy).

advertisement, and communication of their activities.¹²⁸ The data that they generate could be used for the identification of trafficking networks in the physical world.¹²⁹ Although such operations are not yet widespread, they are certainly not hypothetical either. For instance, big data science was used to successfully map human trafficking networks in India and to help fostering prevention tools in the civil society.¹³⁰ If effectively used by States for fighting criminality, these new technologies could also be applied for the protection of individuals. Nonetheless, that would depend significantly on political will and, as discussed below, would not be without risks.

IV. LIMITS AND RISKS OF USING BIG DATA IN INTERNATIONAL MIGRATION

New technologies based on big data are increasingly present in many areas of societal interests.¹³¹ As discussed above,¹³² these technologies have the potential to contribute to better international migration management and enhance the protection of migrants at risk. However, unrestrained use of such technologies could in fact pose serious risks to the safety of migrants, as well as amount to unjustified interference with their right to privacy and data protection.

A. *Migrant Safety and Protection*

Big data analysis has the potential to provide accurate and detailed breakdown not only of human migration patterns,¹³³ but also of one's individual behaviours and potentially one's identity.¹³⁴ It is presently possible to determine with precision behaviour relating to virtually all

¹²⁸ Hao Wang et al, *Data integration from open internet sources to combat sex trafficking of minors*, PROC. 13TH DIG. GOV. RESEARCH CONF. 246, 247 (2012) (“[a]s with licit activities, the use of the Internet in child sexual abuse is increasing with greater use of digital media”); Mark Latonero et al., *Human Trafficking Online. The Role of Social Networking Sites and Online Classifieds*, Report, USC Annenberg Center on Communication Leadership & Policy, 8 (2011) available at <http://ssrn.com/abstract=2045851> (“[t]he rapid expansion of the Internet and online technologies is affecting numerous aspects of daily life around the globe, including facilitating domestic and international trafficking in persons”).

¹²⁹ Konrad et al., *supra* note 127, at 738 (enumerating the technologies that can be used to analyse data from the Internet and potentially assist victim protection).

¹³⁰ At the initiative of the Indian NGO My Choices Foundation. See Nital Bhalla, *Big data maps India's human traffic hot spots*, REUTERS (May 31, 2017) available at <http://www.reuters.com/article/us-india-trafficking-technology/big-data-maps-indias-human-traffic-hot-spots-idUSKBN18R21N>.

¹³¹ See *supra* note 32.

¹³² See *supra* Sections II and III.

¹³³ See Pew Research Centre, *The Digital Footprint of Europe's Refugees*, *supra* note 31.

¹³⁴ See KITCHIN, *THE DATA REVOLUTION*, *supra* note 3, at 100-12 (for a detailed explanation of data analytics); World Bank, *Principles on Identification for Sustainable Development: Toward the Digital Age* (2017) available at

areas of one's life. Examples include behaviour ranging from personal care to eating habits and from shopping preferences to health concerns.¹³⁵ Data mining techniques can extract information such as individual names, locations, dates, search terms, or product terminology from large datasets, and link them together in order to determine, for example, how a person's name relates to a location or to an opinion expressed online about a precise item.¹³⁶ These techniques are already used by businesses to promote their products and target specific consumers,¹³⁷ and may also conceivably be used in the domain of international migration.

Besides the obvious issues of respect for privacy and compliance with data protection legislation,¹³⁸ there is a risk that States might use these technologies to further criminalise migration and deny protection to vulnerable groups of migrants. In the context of large movements of migrants and asylum-seekers, it is important to ensure that these new technologies based on big data do not aggravate the risks of refoulement¹³⁹ and extreme borders securitisation.¹⁴⁰ For

<http://documents.worldbank.org/curated/en/213581486378184357/pdf/112614-REVISED-4-25-web-English-final-ID4D-IdentificationPrinciples.pdf>; Ana Beduschi et al, *Building Digital Identities: the Challenges, Risks and Opportunities of Collecting Behavioural Attributes for new Digital Identity Systems* (2017) available at <https://ore.exeter.ac.uk/repository/handle/10871/28297>; Bronwen Manby, *Identification in the Context of Forced Displacement. Identification for Development (ID4D)*, World Bank Group (2016) available at <http://documents.worldbank.org/curated/en/375811469772770030/pdf/107276-WP-P156810-PUBLIC.pdf>.

¹³⁵ See Beduschi et al, *supra* note 134; Coalition, *Visualising Life* (2017) available at <https://coalition.org/business/resources/visualising-life/>.

¹³⁶ KITCHIN, *THE DATA REVOLUTION*, *supra* note 3, at 105 (explaining data mining and how semantics and taxonomies are used to recognise patterns and extract information from documents).

¹³⁷ See GORDON S. LINOFF & MICHAEL J. A. BERRY, *DATA MINING TECHNIQUES: FOR MARKETING, SALES, AND CUSTOMER RELATIONSHIP MANAGEMENT* (2011) (for a general overview of the uses of data mining in business-related matters); Tao Zang et al, *Mining target users for mobile advertising based on telecom big data*, 16 *ISCI* 296, 296 (2016) (on telecom big data mining and mobile advertising targeting customers more accurately).

¹³⁸ See *infra* Section IV, B.

¹³⁹ As per Article 33 (1) of the Convention Relating to the Status of Refugees, U.N.T.S. 189, 137 (Jul. 28, 1951) [hereinafter "Refugee Convention"] ("[n]o Contracting State shall expel or return ("refouler") a refugee in any manner whatsoever to the frontiers of territories where his life or freedom would be threatened on account of his race, religion, nationality, membership of a particular social group or political opinion"). See JAMES C. HATHAWAY & MICHELLE FOSTER, *THE LAW OF REFUGEE STATUS* 21 (2nd edn, 2014) ("Refugee status secures access to protection against *refoulement*, the right not to be sent back to the country of origin for the duration of the risk"); JANE MCADAM, *COMPLEMENTARY PROTECTION IN INTERNATIONAL REFUGEE LAW* 136 (2006) (affirming that "the scope of non-refoulement is recognized under international law as extending beyond Article 33 of the Refugee Convention to encompass torture").

¹⁴⁰ See Christina Boswell, *Migration control in Europe After 9/11: Explaining the absence of securitization*, 45 *JCMS* 589 (2007) (for a definition of securitization); PHILIPPE BOURBEAU (ed.), *HANDBOOK ON MIGRATION AND SECURITY* (2017) (for a general overview of the issue of securitisation of migration); Benjamin J. Muller, *Risking it all at the Biometric Border: Mobility, Limits, and the Persistence of Securitisation*, 16 *GEOPOLITICS*, 91, 97 (2011) (on the application of biometrics to the contemporary border security and the uses of risk management in the field of migration and mobility); Celia Rooney, *Exploiting a Tragedy: The Securitization of EU Borders in the Wake of Lampedusa* (2013) available at <http://bordercriminologies.law.ox.ac.uk/exploiting-a-tragedy> (for a short overview of the already securitisation of migration before the Summer 2015 and the subsequent migration crisis).

example, big data analysis could provide States with the means to identify and locate migrants heading towards their territory.¹⁴¹ This information could be used to streamline pushbacks of individuals without a thorough examination of their claims. Hence, big data could be used as an instrument of exclusion of undesirable migrants at increasingly closed and secured borders.¹⁴² In addition, relying primarily on big data to profile migrants and distinguish them from terrorists, criminals and human traffickers could lead to automated decision-making, which might intensify the threat of discrimination.¹⁴³ For example, research demonstrates that this is already the case with facial recognition software in relation to racial and ethnic minorities.¹⁴⁴

Furthermore, information falling into the wrong hands, like State authorities engaged in the persecution of asylum-seekers or non-State actors such as criminal and terrorist groups, can have drastic consequences. If not appropriately used, big data could harm more than help the protection of migrants' human rights. For example, human traffickers and other criminal groups theoretically could use big data analytics or hack into official databases to estimate where migrants tend to concentrate, identify the routes they use, and target vulnerable migrants more efficiently.¹⁴⁵ The information also could be used, for instance, to incite violence against specific migrant groups by communicating their geolocation to extremist groups.

¹⁴¹ See *supra* notes 31 and 75-7.

¹⁴² See Peter Andreas, *Redrawing the Line. Borders and Security in the Twenty-first Century*, 28 INT'L SEC. 78 (for a comprehensive analysis of the relationship between borders and security interests in the United States and the European Union).

¹⁴³ See CATHY O'NEIL, *WEAPONS OF MATH DESTRUCTION: HOW BIG DATA INCREASES INEQUALITY AND THREATENS DEMOCRACY* (2016) (calling for a more responsible use of algorithms and for more regulation of big data usages); Brent Daniel Mittelstadt et al., *The ethics of algorithms: Mapping the debate*, *BIG DATA & SOCIETY* 3, 8 (“[p]rofil[ing] algorithms identify correlations and make predictions about behaviour at a group-level ... Profiling can inadvertently create an evidence base that leads to discrimination”);

¹⁴⁴ See Clare Garvie et al., *The Perpetual Line-Up. Unregulated Police Face Recognition in America*, Center on Privacy & Technology at Georgetown Law (October 18, 2016) available at <https://www.perpetuallineup.org/> (about the use of face recognition technology by the police in the United States and its implications for the protection of civil liberties and the rights of racial and ethnic minorities); Joy Buolamwini, *InCoding—In The Beginning*, MIT Media Lab (May 16, 2016) available at <https://medium.com/mit-media-lab/incoding-in-the-beginning-4e2a5c51a45d> (explaining the existence of embedded bias in coding);

¹⁴⁵ Konrad et al., *supra* note 127, at 737 (demonstrating that mapping of victims and traffickers networks via analytics is possible).

Consequently, it is important to create systems that can harness data and metadata¹⁴⁶ in large quantities but that are also consistent with human rights protection.¹⁴⁷ Public-private initiatives have been placing a greater emphasis on user's data ownership, notably when it comes to big social data.¹⁴⁸ This is certainly an interesting development where more research is needed, notably insofar as privacy rights and data protection are concerned.

B. *Migrant Privacy and Data Protection*

Telecommunications and personal data in electronic format are encompassed in the right to respect for one's private life and correspondence.¹⁴⁹ State action in this regard should not result in

¹⁴⁶ *Data*, OXFORD ENGLISH DICTIONARY (2017) ('[t]he quantities, characters, or symbols on which operations are performed by a computer, which may be stored and transmitted in the form of electrical signals and recorded on magnetic, optical, or mechanical recording media'); *Metadata*, OXFORD ENGLISH DICTIONARY (2017) ('[a] set of data that describes and gives information about other data'). See also Jenn Riley, *Understanding Metadata. What is Metadata, and What is it for?*, National Information Standards Organization (2017) available at http://www.niso.org/apps/group_public/download.php/17446/Understanding%20Metadata.pdf.

¹⁴⁷ See Organization for the Advancement of Structured Information Standards (OASIS), *Classification of Everyday Living (COEL) TC* (2017) available at <https://coelition.org/business/resources/coel-standard/> (supporting collection and processing of behavioural data in a way that personal data is pseudonymised at the source).

¹⁴⁸ For instance, the ID2020 initiative aiming at making digital identities available for all individuals who do not have an official proof of identity by 2020, relies on public-private partnerships including start-ups, technology companies and United Nations agencies such as the UNHCR (see <http://id2020.org/>).

¹⁴⁹ Articles 12 of the UDHR, 8 of the ECHR, 17 of the ICCPR, 11 of the ACHR. In the European Union context, see Article 7 (Respect for private and family life) and Article 8 (Protection of personal data) of the Charter of Fundamental Rights of the European Union (CFREU), OJ C 326 391 (Oct. 26, 2012). See also UNGA Resolution 68/167, *The Right to Privacy in the Digital Age*, *supra* note 85, ¶ 3 (affirming that "the same rights that people have offline must also be protected online, including the right to privacy"); *Klass v. Germany*, App No. 5029/71, ¶ 41 (Eur. Ct. H.R., Sept. 6, 1978) (affirming that telephone conversations fall within the realm of Article 8 of the ECHR under the notions of private life and correspondence); *P.G. and J.H. v. United Kingdom*, App No. 44787/98, ¶ 57 (Eur. Ct. H.R., Sept. 25, 2001) (using the definition of personal data as "any information relating to an identified or identifiable individual" as per Article 2 of the Council of Europe's Convention of 28 January 1981 for the protection of individuals with regard to automatic processing of personal data, ETS No.108); *Liberty and others v the United Kingdom*, App No. 58243/00, ¶ 56 (Eur. Ct. H.R., Jul. 1, 2008) (affirming that "telephone, facsimile and e-mail communications are covered by the notions of "private life" and "correspondence" within the meaning of Article 8"); *Uzun v. Germany*, App No. 35623/05, ¶ 52 (Eur. Ct. H.R., Sept. 2, 2010) (relating to GPS surveillance and use of the data obtained thereby); *Bărbulescu v. Romania*, App No. 61496/08, ¶ 74 (Eur. Ct. H.R., Sept. 5, 2017) (affirming that internet instant messaging services "is just one of the forms of communication enabling individuals to lead a private social life"); *Tristán Donoso v. Panamá*, Preliminary Objections, Merits, Reparations and Costs, Judgment, Inter-Am. Ct. H. R. (ser. C) No. 193, ¶ 55 (Jan. 27, 2009) (relating to surveillance of telephone communications); *Escher et al. v Brazil*, *supra* note 85, ¶¶ 114-5 (Jul. 6, 2009) (relating to telephone communications and use of new technological tools). See also MICHAEL N. SCHMITT, *TALLINN MANUAL 2.0 ON THE INTERNATIONAL LAW APPLICABLE TO CYBER OPERATIONS*, Rule 35 (2017) ("[i]ndividuals enjoy the same international human rights with respect to cyber-related activities that they otherwise enjoy").

a disproportionate restriction upon these rights.¹⁵⁰ In principle, this general rule should apply to all individuals, including foreigners who fall within the jurisdiction of a State party to a human rights treaty providing for the protection of these rights.¹⁵¹ Accordingly, migrants' telecommunications and personal data should receive the same level of protection as the one offered to nationals. Nevertheless, domestic legal regimes such as those in the United States and Canada treat foreigners located outside of their territory differently insofar as data protection and privacy rights are concerned.¹⁵² Concerns about the lack of protection of foreign individuals have intensified since the US National Security Agency (NSA) affair in 2013.¹⁵³ The ready availability of large amounts of data has indeed contributed to expanding the options for mass surveillance of nationals and foreigners alike.¹⁵⁴

¹⁵⁰ See for instance, *Uzun v. Germany*, *supra* note 149, ¶ 78 (affirming that “the notion of necessity implies that the interference corresponds to a pressing social need and, in particular, that it is proportionate to the legitimate aim pursued”); *Bărbulescu v. Romania*, *supra* note 149, ¶ 121 (affirming that despite the rapid developments in the area of electronic communications, “proportionality and procedural guarantees against arbitrariness are essential”); *Escher et al. v. Brazil*, *supra* note 85, ¶ 116 (affirming that “the right to privacy is not an absolute right and can be restricted by the States, provided interference is not abusive or arbitrary; to this end, it must be established by law, pursue a legitimate purpose and be necessary in a democratic society”); United Nations High Commissioner for Human Rights, *The Right to Privacy in the Digital Age*, Report of the Office of the United Nations High Commissioner for Human Rights, ¶ 23, A/HRC/27/37 (Jun. 30, 2014) (affirming that “any limitation to privacy rights reflected in article 17 must be provided for by law, (...) must be necessary for reaching a legitimate aim, as well as in proportion to the aim and the least intrusive option available (...) must not render the essence of the right meaningless and must be consistent with other human rights, including the prohibition of discrimination”).

¹⁵¹ Articles 12 of the UDHR, 17 of the ICCPR, 8 of the ECHR and 11 of the ACHR employ the terms “no one” and “everyone” to define the subjects of protection in relation to privacy, home and correspondence. See also, Article 5(1) b of the Declaration on the Human Rights of Individuals who are not Nationals of the Country in which They Live, G.A. res. 40/144, annex, 40 U.N. GAOR Supp. (No. 53) at 252, U.N. Doc. A/40/53 (1985) (affirming that aliens shall enjoy the protection against arbitrary and unlawful interference within their privacy rights).

¹⁵² United States Foreign Intelligence Surveillance Act, §1881(a), 50 U.S.C. §36 (“[n]otwithstanding any other provision of law, upon the issuance of an order in accordance with subsection (i)(3) or a determination under subsection (c)(2), the Attorney General and the Director of National Intelligence may authorize jointly, for a period of up to 1 year from the effective date of the authorization, the targeting of persons reasonably believed to be located outside the United States to acquire foreign intelligence information”); Canada National Defence Act, S. 273.64 (2) (a), S.C. 1985, c N-5 (Can.) (“[a]ctivities carried out under paragraphs (1)(a) and (b); (a) shall not be directed at Canadians or any person in Canada”).

¹⁵³ Human Rights Committee, Concluding observations on the fourth periodic report of the United States of America, ¶ 22 (a) CCPR /C/USA/CO/4 (Apr. 23, 2014) (affirming that the United States should adopt “measures to ensure that any interference with the right to privacy complies with the principles of legality, proportionality and necessity regardless of the nationality or location of individuals whose communications are under direct surveillance”). See also RUSSELL A. MILLER (ed.) *PRIVACY AND POWER. A TRANSATLANTIC DIALOGUE IN THE SHADOW OF THE NSA-AFFAIR* (2017) (for an insightful discussion of the NSA affair); Davor Jancic, *The Role of the European Parliament and the US Congress in Shaping Transatlantic Relations: TTIP, NSA Surveillance, and CIA Renditions*, 54 J. C. M. S. 896, 903 (2016) (for a discussion about the role of EU institutions in the aftermath of the revelations in the NSA affair).

¹⁵⁴ See notably Bos-Ollermann, *supra* note 85, at 140 (discussing the ‘bulk collection’ of untargeted data in mass surveillance techniques); Lyon, *supra* note 85, at 5 (affirming that big data “intensify surveillance by expanding interconnected datasets and analytical tools”).

Surveillance based on new technologies and big data can place State authorities on the top of a digital Panopticon.¹⁵⁵ Individuals seem to know that they might be observed, but might not know how exactly and by whom. As in Foucault’s model of Panopticon, they are those “[who are] seen, but [do] not see; [who are] the object of information, never a subject in communication.”¹⁵⁶ In the digital era, our smallest deeds and gestures can become highly visible and therefore subjected to surveillance. The safeguard of public interests plays a considerable role in limiting the scope of one’s rights to privacy and data protection in this digital Panopticon model of State surveillance. For instance, the ECtHR has held that the surveillance via GPS and use of the data obtained thereby in criminal proceedings had been proportionate to the interests of national security and public safety, the prevention of crime and the protection of the rights of the victims, as the criminal investigation had concerned “very serious crimes” relating to terrorist activities.¹⁵⁷ The ECtHR also noted that when acting in the interests of national security or for the prevention of serious crimes, State authorities are not expected to exhaustively disclose all the circumstances and conditions in which they can resort to secret surveillance measures.¹⁵⁸

Clearly, the public interest is not alone sufficient to restrain one’s right to the protection of their private life and correspondence. Any interference must be “strictly necessary” and proportionate, striking a fair balance between the competing public and private interests at stake.¹⁵⁹ Accordingly, any uses of big data by States for migration management or for the protection of vulnerable migrants should conform to these exigencies, even if State action is motivated by legitimate interests such as public safety or the protection of the rights and freedoms of others.¹⁶⁰ For instance, the protection of vulnerable migrants’ personal data and privacy should be taken into account while States put forward efforts to prevent irregular migration and fight human trafficking and people smuggling.¹⁶¹

¹⁵⁵ The Panopticon, as proposed by Jeremy Bentham, is a circular building structured around a central watch tower from which a watchperson can monitor the individuals placed in cells below her, without being noticed. See JEREMY BENTHAM, *WORKS OF JEREMY BENTHAM*, vol. 4 (Panopticon, Constitution, Colonies, Codification) (John Browning ed.) (1843). See also, RHEINGOLD HOWARD, *THE VIRTUAL COMMUNITY: FINDING CONNECTION IN A COMPUTERIZED WORLD*, 289 (1994) (introducing the term digital Panopticon).

¹⁵⁶ MICHEL FOUCAULT, *DISCIPLINE & PUNISH. THE BIRTH OF THE PRISON*, 200 (Vintage Books, 1995) (1977).

¹⁵⁷ *Uzun v. Germany*, *supra* note 149, ¶¶ 52 & 80.

¹⁵⁸ *Kennedy v. the United Kingdom*, App No. 26839/05, ¶ 159 (Eur. Ct. H.R., May 18, 2010).

¹⁵⁹ See notably, *Klass v. Germany*, *supra* note 149, ¶ 42; *Szabó and Vissy v. Hungary*, *supra* note 85, ¶ 73.

¹⁶⁰ See Article 8 (2) of the ECHR.

¹⁶¹ See UNGA, *New York Declaration for Refugees and Migrants*, *supra* note 72, ¶¶ 23 and 35.

Big data can also have important consequences with respect to horizontal relationships between private parties. Individuals voluntarily consent to the collection, storage and occasional use of their data by the companies that provide the service they benefit from.¹⁶² Moreover, they voluntarily upload information on social networks such as Facebook, Instagram, YouTube, or Twitter and they allow mobile applications to track their activities, their movements, or even their health statuses and sleep patterns. Therefore, non-State actors potentially have access to a goldmine of information about individuals' behaviour, including migrants' behaviour. This has implications for their expectations as to privacy and data protection. Accordingly, it is necessary to factor non-State actors such as private companies into the equation as well. As Sarah Horowitz correctly observes, "Foucault's model of the Panopticon is more helpful in thinking about state surveillance – which is not voluntary – than it is for thinking about our interactions with private data collection efforts."¹⁶³ In this regard, the contemporary digital Panopticon has not one but several watchpersons, pursuing a plurality of objectives not always based on the safeguarding of the public interest.

Consequently more rigorous control of the use of new technologies in the field of international migration is necessary. The existing legal frameworks should be strengthened to regulate collection, usage and storage of personal data and metadata by State and non-State actors alike.¹⁶⁴ Otherwise, the misuse of such technologies could bring about serious negative outcomes to already vulnerable migrants.

¹⁶² For the analysis of the issue of consent, see Bart W. Schermer, *The limits of privacy in automated profiling and data mining*, 27 *COMP. L. & SEC. REV.* 45, 49 (2011) (explaining that despite giving consent for the processing of personal data, individuals underestimate the risks that certain uses of this data can have, such as in the case of automated profiling); Fred H. Cate & Viktor Mayer-Schonberger, *Notice and consent in a world of Big Data*, 3 *INT'L DATA PRIVACY L.* 67, 68 (2013) (discussing the formality of notice and consent in collecting and processing big data).

¹⁶³ Sarah Horowitz, *Foucault's Panopticon. A Model for NSA Surveillance?*, in RUSSELL A. MILLER (ed.), *PRIVACY AND POWER. A TRANSATLANTIC DIALOGUE IN THE SHADOW OF THE NSA-AFFAIR*, 39, 62 (2017).

¹⁶⁴ See Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation) OJ L 119 (May 4, 2016) (the EU is pioneering a more restrictive data protection system with the adoption of the new General Data Protection Regulation).

V. CONCLUSION

As new technologies evolve, they present important challenges and valuable opportunities for States under IHRL. Because the development of new technologies based on big data affects States' capabilities, they can be used as a tool for protection of vulnerable individuals.¹⁶⁵ Firstly, big data analysis can be a helpful asset, informing decision-making processes and possibly contributing towards better management of migratory movement and the adoption of sensible policies for reception and integration of migrants and refugees.¹⁶⁶

Secondly, it is suggested that big data can also play a greater role beyond international migration management, as a tool for the identification of individuals in need of protection, such as migrants at risk of dying at sea and those who are potential victims of ill-treatment and human trafficking.¹⁶⁷ As new technologies evolve and improve State capabilities, the interpretation of what is reasonably expected from States should also evolve. Whereas it is not possible to generally infer that States have a comprehensive obligation to use new technological means to protect migrants' lives and against ill-treatment or human trafficking, State positive obligations under IHRL may encompass such means in specific circumstances, such as in the case of the prevention of migrant deaths at sea.¹⁶⁸

However, the uses of new technologies based on big data analysis are not without risks. They could be used as an additional tool of control leading to further criminalisation of migration and increased risks of refoulement.¹⁶⁹ Moreover, in the wrong hands, behavioural digital data could be used to increase the oppression of already exposed groups of people, amplifying their vulnerability and even preventing them from seeking asylum abroad. Besides, unbridled digital surveillance by public authorities could amount to unjustified interference with the right to the protection of one's private life and correspondence.¹⁷⁰

Therefore, as new technologies are being developed, they should be regulated by laws and covered by policies at the international level. Data collection, storage and accessibility of

¹⁶⁵ See *supra* note 43 (on the concept of vulnerability).

¹⁶⁶ See *supra* Section II.

¹⁶⁷ See *supra* Sections III, B and III, C.

¹⁶⁸ See *supra* Section III, B.

¹⁶⁹ See *supra* Section IV, A.

¹⁷⁰ See *supra* Section IV, B.

information should be considered and regulated prior to any comprehensive use of behavioural digital data for migration management or protection purposes. States should agree to adopt a rights-based approach in this area. Ideally, that should become part of the current process of negotiations of the Global Compacts on Migration and on Refugees.¹⁷¹ New technologies and innovation have the potential to be used as a powerful instrument for the protection of migrants' legal rights. However, they can also be used to deny refuge or exclude individuals from protection. Accordingly, they should evolve within the existing legal framework of IHRL.

¹⁷¹ UNGA, New York Declaration for Refugees and Migrants, *supra* note 72, ¶ 21. See also, Thomas Gammeltoft-Hansen et al., *What is a Compact? Migrants' Rights and State Responsibilities Regarding the Design of the UN Global Compact for Safe, Orderly and Regular Migration*, Raoul Wallenberg Institute of Human Rights and Humanitarian Law Working Papers, available at http://rwi.lu.se/app/uploads/2017/10/RWI_What-is-a-compact-test_101017-senaste-1.pdf (for an analysis of the Global Compact for Safe, Orderly and Regular Migration nature, normativity and relationship with other instruments of international law).