

Migration Predictions with a Pinch of Salt:

Definitions and Reliability

Keywords: 'migration predictions', 'migrant definition', 'refugees and migrants', technology, forecasting, 'refugee', 'people on the move', '(un)recognised refugees'

Abstract

Migration prediction or forecasting is an emerging predictive IT method in migration governance. Advocates of migration prediction argue that forecasting migratory flows could enhance humanitarian preparedness and overall support the management of migration. However, while migration flow predictions could potentially be beneficial, predictions risk jeopardizing fundamental rights. Building on our previous work on the human rights challenges of migration prediction, this article zooms into the reliability of migration prediction. The article unearths persistent and deep-rooted muddling of legal definitions used in predictions and their inconsistent use, sometimes due to cross-disciplinary confusion and sometimes due to unresolved legal debates shaped by political undertones. It revisits terminological debates regarding the legal definition of 'migrants' and 'refugees' to argue in favour of an inclusive understanding of the term migrants as an umbrella term but is concerned that there is no coherence in the use of these terms by various stakeholders in predicting migration, including the main organisations producing datasets. The article concludes that contrary to the much-celebrated use of IT in predicting migration, the unreliability of such emerging data seriously undermines any 'added value' of such predictions to humanitarian preparedness and migration management.

1 Introduction

1.1 Migration technologies

Migration technologies pertaining to forecasting mobility¹ have made their way to the governance of migration.² Migration technologies refer to ‘the many forms of technological systems’ used to document and interfere with the movement of people across national borders.³ Such technologies include, for example, AI systems employed for facial, dialect or emotion recognition, which promise efficient identity checks at border controls, or/and expedited and dependable decision making on asylum.⁴ AI systems include highly technologised models of migration management,⁵ such as drones, lie detectors and AI-based identification systems, or databases with detailed estimates and characteristics of immigrant populations.⁶ Migration technologies using language identification and identity fraud detection are also relied upon for online applications for residence permits and citizenship.⁷

¹ Tschalaer, M., Xanthaki, A., & Xanthopoulou, E., 2025. Human Rights Risks of Migration Flow Predictions and Policy Implications Within the EU. *Human Rights Quarterly* 47(1), pp. 87-114.

² European Commission, Preparing the next steps in border management in the European Union COM (2008) 69, 2 and 5; European Council, (2009) The Stockholm Programme – An open and secure Europe serving and protecting the citizens OJ C115/ 1; See European Council, Document EUCO 79/ 14 (27 June 2014) 2.

³ Dijstelbloem, H., Meijer, A., & Besters, M. (2011). The Migration Machine, in: *Migration and the New Technological Borders of Europe*. H. Dijstelbloem, A. Meijer (Eds.) p. 4, Springer, New York, USA.

⁴ Molnar, P., 2019. Technology on the Margins: AI and Global Migration Management from a Human Rights Perspective. *Cambridge International Law Journal* 8(2), p. 305.

⁵ Amoore, L., 2006. Biometric Borders: Governing Mobilities in the War on Terror. *Political Geography* 25, p. 336; Brouwer, E. (2008). *Digital Borders and Real Rights: Effective Remedies for Third- Country Nationals in the Schengen Information System*. Martinus Nijhoff Publishers, Norwell, Massachusetts.

⁶ Center for Migration Studies. Estimates of the US Undocumented and Other Immigrant Populations. Available at: <https://cmsny.org/research-and-policy/data/>.

⁷ European Migration Network, (2022). *The Use of Digitalisation and Artificial Intelligence in Migration Management: Joint EMN-OECD Inform*. p. 3. Available at: <https://www.oecd.org/migration/mig/EMN-OECD-INFORM-FEB-2022-The-use-of-Digitalisation-and-AI-in-Migration-Management.pdf>.

Asylum or migration-related EU agencies have taken a keen interest in migration technologies. The European Commission has funded a wide array of projects developing such technological tools.⁸ From BORDERUAS, developing an unmanned aerial vehicle to support border surveillance,⁹ to NADINE, developing a digital system for the social support of migrants,¹⁰ migration technologies have various functionalities. While some tools focus on the support of migrants' integration, others are concerned with supporting border security. For example, iBorderCtrl (Intelligent Portable Border Control System) has developed an AI technology that, among others, detects deception at border crossings to decrease, as mentioned, 'illegal crossings' and boost confidence in security border checks.¹¹ The use of migration technologies has, therefore, important consequences for migrants and their fundamental rights protection and often conflates security with immigration. Making assumptions about migrants' risk classification, for example, in relation to identity fraud and other forms of criminality relies on racial profiling and deep-rooted stereotyping, that is being reinforced through data.¹²

1.2 Migration Predictions

In this article, we focus on migration predictions, that was the subject of ITFLOWS, a research project we participated in.¹³ Migration prediction or forecasting is an emerging predictive IT tool in migration governance utilised to predict mass migration by drawing on large datasets and analysis of patterns

⁸ For an overview, see ITFLOWS, 2023. Final Project Report. Available at: <https://cordis.europa.eu/project/id/882986/results>; Ozkul, D., 2023. Automating Immigration and Asylum: The Uses of New Technologies in Migration and Asylum Governance in Europe. *Refugee Studies Centre, University of Oxford*.

⁹ BorderUAS. Available at: <https://borderuas.eu/>.

¹⁰ NADINE. Available at: <https://cordis.europa.eu/project/id/822601>.

¹¹ See European Commission, (2020). Intelligent Portable Border Control System; Horizon 2020. Available at < <https://cordis.europa.eu/project/id/700626>; Sánchez-Monedero, J., and Dencik, L., 2020. The politics of deceptive borders: 'biomarkers of deceit' and the case of iBorderCtrl. *Information, Communication & Society* 25 (3), pp. 413-430.

¹² Vavoula, N., Karaiskou, A., 2025. Towards Autonomous Borders? Assessing the Human Rights and Rule of Law Challenges of the Deployment of Artificial Intelligence (AI) Systems for Migration Management. *Computer Law & Security Review*, Special Issue; Vavoula, N., 2023. (Discriminatory) Algorithmic Profiling and Ineffective Remedies: The Cases of ETIAS and VIS. *ASYL* 3, p. 13; La Fors, K., and Meissner F., 2022. Contesting border artificial intelligence: Applying the guidance-ethics approach as a responsible design lens. *Data & Policy* 4, e36.

¹³ ITFLOWS. Available at: <https://cordis.europa.eu/project/id/882986>.

and trends in migration to predict possible future migratory flows¹⁴. Predictions rely on computational modelling which is a widely used technique to gain insights into the dynamics of forced migration with machine learning (ML)¹⁵ and Agent-Based Models (ABM) being the dominant techniques.¹⁶ ML-based models are trained on recent data to produce near-term forecasts, while ‘ABMs focus on curating an understanding on how individual agents behave and interact within their ecosystem, with an indirect aim of producing thoroughly substantiated migration forecasts’.¹⁷ The latter have become popular with stakeholders due to their capacity to model complex system, such as mass migration.¹⁸

Forecasting migration has been the subject of several efforts and studies.¹⁹ For example, Jetson, is a machine learning-based experiment forecasting the movement of displaced persons.²⁰ The International Organization for Migration (IOM) has developed a Displacement Tracking Matrix (DTM) which relies on data collected by key stakeholders such as other UN agencies, national and international NGOs, community leaders, as well as national authorities.²¹ The latter is already used by authorities in Slovakia and Poland to provide informed assistance for the displacement of Ukrainians.²² The EUMigraTool which was developed under the ITFlows EU-funded project is another such example. It used open data gathered from social media and databases of international organisations to forecast

¹⁴ Blasi Casagran, C., Boland, C., Sánchez-Montijano, E., and Vilà Sanchez, E., 2021. The Role of Emerging Predictive IT Tools in Effective Migration Governance. *Politics and Governance* 9(4), p. 133.

¹⁵ Huynh, Benjamin Q., and Sanjay B., 2020. Forecasting internally displaced population migration patterns in Syria and Yemen. *Disaster Medicine and Public Health Preparedness* 14(3), pp. 302–7.

¹⁶ Ghorbani, M., et al., 2024. Flee 3: Flexible agent-based simulation for forced migration. *Journal of Computational Science* 81, pp. 1 - 14.

¹⁷ Ibid, p 2.

¹⁸ Taylor, S., 2019. Distributed simulation: State-of-the-art and potential for operational research. *European Journal of Operational Research* 273, pp. 1-19.

¹⁹ European Commission, 2021. Feasibility study on a forecasting and early warning tool for migration based on artificial intelligence technology. Available at: <https://op.europa.eu/en/publication-detail-/publication/5afa29f0-700a-11eb-9ac9-01aa75ed71a1>; Albertinelli, A., Alexandrova, P., Melachrinos, C., and Wilkin, T., 2020. Forecasting asylum-related migration to the European Union, and bridging the gap between evidence and policy. *Migration Policy Practice* 10(4), pp. 35–41; Carammia, M., Iacus, S., and Wilkins, T., 2020. Forecasting asylum applications in the European Union with machine learning and data at scale. *Scientific Reports* 12.

²⁰ UNHCR. Project JETSON. 2023. Available at: <https://jetson.unhcr.org>.

²¹ International Organization for Migration, 2024. Displacement Tracking Matrix (DTM). Available at: <https://dtm.iom.int/>.

²² ENNHRI, 2024. Technologies, migration and human rights: the role of European NHRIs, p8.

migration flows into the EU and movement to countries neighbouring conflict zones.²³ Other examples include HiDALGO²⁴ that developed software to accurately model and simulate the complex trends which arise in connection with major global challenges; and METICOS²⁵ that created a platform for monitoring and prediction of social impact and acceptability of modern border control technology.

Arguably, forecasting migration is important, because it can provide important insights to policymakers²⁶ and in specific, enhance preparedness to receive migrants.²⁷ After all, it was the lack of preparedness that was put forward as the main reason that EU Member States failed to cope with the so-called 'refugee crisis' in 2015.²⁸ Knowledge of accurate migratory movements could be used to prepare humanitarian responses, to allocate resources for reception, to plan social integration, to ensure more proportionate burden-sharing among Member States and to make better-planned policy decisions regarding the management of migration; ultimately to serve better refugees and other migrants when they arrive to the host state.²⁹

At the same time, migration predictions may also be used for increased awareness around cross-border activities and migration flows. In this respect, scholars and activists have increasingly voiced concerns about the human rights risks posed by migration technologies in general and predictive analytics in particular.³⁰ Predictions known to states and EU organs risk jeopardizing

²³ ITFLOWS, *op.cit.*, fn 13.

²⁴ Available at: <https://hidalgo-project.eu/>.

²⁵ Available at: <https://www.iccs.gr/meticos/>.

²⁶ Groen, D., 2016. Simulating refugee movements: Where would you go?. *Procedia Computer Science*, 80, pp. 2251-2255.

²⁷ Casagran et al, *op.cit.*, fn 14.

²⁸ Carrera, S., and Lannoo, K., 2015. Treat the root causes of the asylum crisis, not the symptoms. CEPS Commentary. Available at: <https://www.ceps.eu/ceps-publications/treat-root-causes-asylum-crisis-not-symptoms/>.

²⁹ Beduschi, A., 2022. Harnessing the potential of artificial intelligence for humanitarian action: Opportunities and risks. *International Review of the Red Cross* 104(919), pp. 1149-1169; Casagran et al, *op.cit.*, fn 14, pp.133-145.

³⁰ McGregor, L., and Molnar, P., 2023. Digital border governance: A human rights-based approach. Project Report. University of Essex and OHCHR; Access Now, 2022. Open letter to the ITFlows Consortium: Stop tech tools for predicting migration that can be repurposed to violate fundamental rights, Available at: <https://www.accessnow.org/press-release/open-letter-itflows-consortium>.

fundamental rights.³¹ Concerns have been raised that the knowledge produced by forecasting tools can be used by national authorities to increase surveillance and border control to curtail migrants' entry to state territory, undermining the right to seek international protection and facilitating potential violations of the non-refoulement principle.³² Predictive analytics tools can also undermine the principle of equality and reinforce discrimination due to the risk of reliance on biased data and the lack of transparency in the way these tools are designed to make decisions.³³

Is the preparedness the real reason behind EU and Member States' prioritization of migration prediction? The reality is that at a time that the EU and the Member States invest in externalisation, containment and deterrence policies,³⁴ predictions offering enhanced awareness of migratory flows have a great appeal for anti-migration politics. Issues of preparation, resources and appropriate reception, allegedly the main reasons for funding migration prediction projects, are caused mainly by political unwillingness to change the law, persistent capacity deficiencies or implementation gaps.³⁵ Technology is indeed a powerful tool; but as a tool it may be abused. In the current European climate of political agendas and policies geared towards strengthening border security and surveillance, humanitarian preparedness does not convince as EU states' priority when investing in migration forecasting computational tools.³⁶ Consequently, organisations, activists and scholars have called for a ban on forecasting tools when these aim to prevent or curtail migration, as they pose a risk to human rights that cannot be mitigated.

³¹ Tschalaer *et al*, *op.cit.*, fn 1.

³² See especially the chart in Guillen, A., Teodoro, E., Gottschack T., *et al.*, 2021. D.2.3 Report on Human Rights, Ethical, Societal and Data protection risk assessments. pp. 33-42. Available at: <https://www.itflows.eu/wp-content/uploads/2022/07/7.-D2.3-ITFLOWS-R.pdf>.

³³ European Union Agency for Fundamental Rights. 2022. Bias in Algorithms – Artificial Intelligence and Discrimination available at: https://fra.europa.eu/sites/default/files/fra_uploads/fra-2022-bias-in-algorithms_en.pdf.

³⁴ Xanthopoulou, E., 2024. Mapping EU externalisation devices through a critical eye. *European Journal of Migration and Law*, 26(1), pp. 108 – 135.

³⁵ Tsourdi, L., 2021. Asylum in the EU: One of the many faces of rule of law backsliding?. *European Constitutional Law Review* 17(3), pp. 471–497.

³⁶ Eklund, M., 2023. Rule of law challenges of 'algorithmic discretion' & Automation in EU border control: A Case Study of ETIAS through the lens of legality. *European Journal of Migration and Law* 25, pp. 249-274.

Our position has been extensively stated elsewhere.³⁷ In brief, we argue that despite the real benefits for migrants that migration predictive technologies may have as we have seen in their use for humanitarian reasons by trusted NGOs and IGOs, including Save the Children, IOM and the UNHCR, the human rights risks associated with them necessitate their exclusion from the hands of both state agencies and EU agencies for migration control and border security. Allowing these entities to have direct access to them bears real risks for human rights violations that cannot be mitigated.

Our conclusions were informed by our participation in ITFLOWS, an inter-disciplinary project on predicting migration funded by the European Commission. It offered us invaluable insights into the effectiveness of such technological tools and the risks they bear. Concerned with providing migration flow predictions in the European Union, ITFLOWS created the EUMigraTool by drawing on multiple sources of information. This tool relied on both AI and non-AI agent-based models of forecasting.³⁸ Our role was to provide the relevant international and European legal framework,³⁹ identify human rights challenges and assess the risk of abuse,⁴⁰ and monitor the compliance of the tool's development with the legal framework.

In this article we are particularly concerned with the *reliability* of migration predictions generated using technological tools. We question the accuracy of forecasting by shedding light on terminological inconsistencies in the use of the computational forecasting. So far, the inaccuracy of predictions has been discussed on the basis of their very nature: human cross-border mobility is uncertain particularly in regards to forced migration.⁴¹ Uncertainty has been directly linked to the diverse nature of

³⁷ Tschalaer *et al*, *op.cit.*, fn 1, pp 87-114.

³⁸ Ghorbani *et al*, 2024. *op.cit.*, fn 16 pp. 1 - 14.

³⁹ Xanthaki, A., Hansen K B., Moraru M-B., et al., 2021. D2.1 Report on the ITFLOWS Legal and Ethical Frameworks on Migrant and Refugees and ITFLOWS Ethnical Framework. Available at: <https://www.itflows.eu/wp-content/uploads/2022/07/2.-D2.1-ITFLOWS-R.pdf>.

⁴⁰ ITFLOWS D2.3 Report, *opt cit.*, fn 32

⁴¹ Ecorys and European Commission, (2020). *Feasibility study on a forecasting and early warning tool for migration based on artificial intelligence technology*. Available at: <https://op.europa.eu/oe/pui/publication-detail/-/publication/946b0bc7-7006-11eb-9ac9-01aa75ed71a1/language-lv/format-PDF/source-search>.

migration drivers and the difficulties of a journey as well as the unpredictability of state involvement.⁴² However, we argue that accurate predictions at this stage are elusive also because of the definitional discrepancies in data integration and analysis. Ignored or downplayed definitional inconsistencies in data integration impact largely on the accuracy of predictions and their communication to stakeholders, a proposition that has been overlooked. Definitional challenges, coupled with data bias and the uncertainty of forced migration, raise important doubts on the reliability of predictions of migratory movement. To prove our argument, we examine the issue of terminological divergence across disciplines and how it leads to inaccuracy (Section 2). Section 3 and 4 discuss the complicated issue of divergent legal definitions dividing the legal community and reflecting on the deep-rooted, political dimensions of the dichotomy. Section 5 explores the last piece of the puzzle, i.e. data bias adding to reliability concerns. Finally, section 6 examines recent legal developments and their implications on migration forecasting.

2 Divergent Use of Definitions Across Disciplines

Although scholarship has gradually focused -justifiably so- on data bias as an important reason for inaccurate predictions in migration technologies,⁴³ the lack of consistent language in data collection and integration has not been explored as an additional important factor for inaccurate predictions in migration. The different terms used in data for people on the move lead to inconsistent categories of people being identified, which in turn leads to inaccurate predictions. Such differences originate from the fragmentation that exists in scholarship on migration among lawyers, social and political scientists and technical experts. It is also a reflection of lack of consensus among the legal community itself on the scope of the related terms. This section explores the inconsistent use of definitions across an

⁴² Carammia, *et al*, *op.cit.*, fn 19; ITFLOWS, 2023. Multidimensional drivers and fragmented journeys: the challenge for the EU of external partnerships on migration. ITFLOWS Policy Brief #1. Available at: <https://www.itflows.eu/documents/policy-brief-1/>.

⁴³ Beloso, M L. (2022) Women's rights under AI regulation: Fighting AI gender bias through a feminist and intersectional approach, in: *Law and Artificial Intelligence*. B. Custers, E. Fosch-Villaronga (Eds.) pp 87-107, T.M.C. Asser Press, The Hague, the Netherlands; Noble, S. (2018). *Algorithms of Oppression: How Search Engines Reinforce Racism*. New York University Press, New York, USA; Benjamin, R. (2019). *Race After Technology*. Polity Press, Cambridge, United Kingdom.

interdisciplinary board and its implications before delving into issues arising from divergent legal approaches.

The lack of common terminology across projects and across different data sources within the same project leads to confusion between prediction goals and findings and, hence, affects the reliability of the latter. This is further exacerbated by the fragmentation that often exists between computing experts working on creating such technological tools and social scientists focused on aspects of law, sociology and politics, put together in projects without in reality having the willingness, time and focus to really understand each other's foundations. The lack of common ground and mutual, clear understanding among different disciplines is one important pitfall of intra-disciplinarity, and really affects the outcome in migration prediction projects.⁴⁴ Difficulties in communicating across specialised disciplines are often not addressed, because often each discipline is working on a specific element of the project chain so the different use of terminologies does not become obvious. This adds to the maintenance of cognitive or conceptual barriers⁴⁵ and often gives rise to a cognitive dissonance among the stakeholders of a project, which is just one of the reasons why discrepancies are caused. As it is later analysed, the matter is not only methodological or technical but terminological differences also stem from differing legal classifications or preferences.

Varying use of terminology among bodies whose databases are used and the terminology of a project might also lead to confusion. An obvious effect is the discrepancy between the promised outcome of the project and the outcome. For example, the EUMigraTool promised to predict *migratory flows* broadly speaking. But in doing so, it drew data from arrivals at refugee camps or registrations of formal asylum applications.⁴⁶ The scope of these data sets were not sufficient to produce the promised outcome because the technical experts organising the data could not understand that different databases used the same terminology to include different categories of

⁴⁴ Mäki U., 2016. Philosophy of interdisciplinarity. What? Why? How?. *Euro Jnl Phil Sci* 6, pp. 327-342.

⁴⁵ Mazzocchi, F., 2019. Scientific research across and beyond disciplines: Challenges and opportunities of interdisciplinarity. *EMBO Reports* 20(6).

⁴⁶ ITFLOWS Repository refers to 'Monthly asylum applications data used as variable of prediction'.

persons. For example, Eurostat, does not include persons who have not yet applied for asylum in the category of asylum seekers; yet, it was used by EUMigraTool to predict migration, broadly speaking without making a distinction. This would lead to completely inaccurate results as either only the migrants arriving in camps or only the asylum seekers who had managed to formally apply for asylum would be counted. Technical experts could not know the difficulties in applying for asylum formally, even though an asylum seeker in substance; neither could they fully appreciate the different sections of population that can be included in these categories (recognised, unrecognised, living privately, living in hot spots, etc); and legal experts would not *prima facie* look at databases so that they would be confronted with the problem and convey it to technical experts. Eurostat's statistical approach, on the one hand, is reasonable, as a registered application can be counted towards statistics. However, since not all asylum seekers have the chance to declare that they intend to apply for international protection,⁴⁷ Eurostat's data is not representative of the actual numbers of asylum seekers but only of those registered to the point of counting. This raises concerns about the reliability of statistical data. In ITFlows this was identified and eventually modified, but such a discrepancy between the goal and the outcome can go unnoticed or downplayed.

Such challenges defeat the purpose of producing accurate forecasting to support humanitarian actors in better supporting the people whose arrival is predicted and leads to inaccurate knowledge. Unfortunately, currently such knowledge cannot be pinned down to a clearly defined and delineated group; and there is no coherence in terminology in all databases.

If a tool relies on more than one forecasting models or datasets the risk of inconsistency is even higher. For example, the ITFLOWS project developed the EUMigraTool that enables users to forecast migrant arrivals by relying on three distinct models of forecasting that utilise gathered data broadly using two complementary approaches to simulation and forecasting, namely agent-based

⁴⁷ Eurostat Database. Available at: <https://ec.europa.eu/eurostat/web/migration-asylum/asylum/database>

modelling, and artificial intelligence.⁴⁸ The first forecasting model is designed to help NGOs make rough short-term predictions regarding arrivals from specific countries of origin, using data from GDELT, Eurostat, and All News data set.⁴⁹ The second model focuses on countries of origin to discern potential conflicts that might give rise to internal or other displacement. The third model provides predictions of migrant flows three to five months ahead relying on Google Trends by using keywords to discern the potential of migration. These models and the researchers using them employed different terms referring to migrant groups (migrants, refugees, asylum-seekers etc) interchangeably. The more stakeholders are involved, the higher the risk of confusion over legal definitions of different migrant groups and the legal effect of their differentiation.

Confusion over legal terminologies leading to an inconsistent use of terms was embedded within the research project and remained difficult to address, despite coordinated efforts to produce a glossary of terms. Unless every stakeholder is on board, such danger of inaccurate representation of data cannot be discounted. Undeniably, such discrepancy is a blow on predictions' reliability.

An obvious suggestion when addressing definitional confusion and inconsistency within interdisciplinary research projects is to increase awareness of terminology and spend time to educate and agree on consistent language. This might address the risk of miscommunication. However, absolute consistency might not be a realistic goal considering the disagreement even within the legal world concerning the contours of the 'migrant' and the 'refugee' definitions. Attempts to address this challenge by generating glossaries⁵⁰ for a large consortium to follow are also welcome but their value is eventually limited to the realities of implementation across the board and the different uses in databases.

⁴⁸ Casagran, C B., and Stavropoulos, G., 2024. Developing AI predictive migration tools to enhance humanitarian support: The case of EUMigraTool. *Data & Policy* 6:e64.

⁴⁹ Ibid, p. e64-3.

⁵⁰ Glossary of terms. Available at: <https://cordis.europa.eu/project/id/882986/results>.

3 Divergent Legal Definitions on Migrants

In addition to the inconsistent use of terms within a project and across disciplines, as discussed above, inaccuracy is also exacerbated by the divergent legal approaches in defining migrants and refugees. Indeed, who is a refugee and who is a migrant is not an agreed issue among the legal and international community and the divergence seriously affects the reliability of predictions of migratory flows. Legal experts of the same team can have different understandings concerning definitional issues therefore leading to different counting, different voices being heard, and different experiences being transmitted. There are two important legal definitional questions that affect the accuracy of the data: First, does the category 'migrants' also include refugees? And second, does the category of refugees include 'unrecognised refugees', namely migrants who fulfil the criteria of refugees but have not yet been identified or even applied for refugee status? This section explores the first question on the contours of the term 'migrant' before delving into the scope of the term 'refugee' in the next section.

International bodies from which data is drawn for forecasting purposes use divergent terminology with respect to the scope of the term 'migrant'. The IOM insists that a migrant is "an umbrella term, not defined under international law, reflecting the common lay understanding of a person who moves away from his or her place of usual residence, whether within a country or across an international border, temporarily or permanently, and for a variety of reasons."⁵¹ In a 2007 IOM blog, the separation between migrants and refugees is criticized: the dichotomy between refugees and economic migrants, it is argued, "is not only unfortunate – given its oversimplification – but inaccurate."⁵² Yet, the UNHCR disagrees and argues that 'migrants and 'refugees' "have distinct and different meanings, and confusing them leads to problems for both populations."⁵³ "The tendency to

⁵¹ International Organization for Migration (IOM), 2019. Glossary on Migration. International Migration Law, No. 34. Available at: https://publications.iom.int/system/files/pdf/iml_34_glossary.pdf.

⁵² Althaus, A. The False Dichotomy between 'Economic migrants' and Refugees. *IOM BLOG*. Available at: <https://weblog.iom.int/false-dichotomy-between-economic-migrants-and-refugees>.

⁵³ UNHCR, 2016. UNHCR viewpoint: 'Refugee' or 'migrant' – Which is right?. Available at: <https://www.unhcr.org/news/stories/unhcr-viewpoint-refugee-or-migrant-which-right>.

conflate refugees and migrants, or to refer to refugees as a subcategory of migrants, can have serious consequences for the lives and safety of people fleeing persecution or conflict,” UNHCR notes.⁵⁴

In international law, there is no universally accepted definition of the term ‘migrant’. According to the data of the EU Fundamental Rights Agency, there are, under EU law, ‘some 25 different categories of third-country nationals, each with different rights that vary according to the links they have with EU Member States or that result from their need for special protection’.⁵⁵ In the absence of a universally accepted definition, the term ‘migrant’ is therefore a generic socio-legal term. The International Convention on the Protection of the Rights of Migrant Workers and Members of their Families (General Assembly resolution 45/158) defines in Article 2(1) the term ‘migrant worker’ and not migrant in general. A ‘migrant worker’ is defined as a person who is to be engaged, is engaged or has been engaged in a remunerated activity in a State of which he or she is not a national. Considering that the term focuses on working migrants, it is of limited applicability but is helpful in our understanding of the contours of the term migrant. EU law does not refer to migrants but to ‘third country nationals’ which as a term includes migrants, as

‘any person who is not a citizen of the Union within the meaning of Article 17(1) of the Treaty and who is not a person enjoying the Community right of free movement, as defined in Article 2(5) of the Schengen Borders Code’.⁵⁶

In addition to the absence of a legal definition of the term ‘migrant’, a second question is whether the term ‘migrants’ includes refugees. There are two approaches in this respect. In its widest scope,⁵⁷ the term ‘migrants’ also *includes* refugees. This approach acknowledges that refugees benefit

⁵⁴ UNHCR. 2018. Refugees’ and ‘Migrants’ - Frequently Asked Questions (FAQs). Available at: <https://www.refworld.org/reference/tools/unhcr/2018/en/109484>.

⁵⁵ Council of Europe and European Union Agency for Fundamental Rights, (2020). *Handbook on European law relating to asylum, borders and immigration*, Publications Office of the European Union, p 14.

⁵⁶ European Parliament and Council, 2008. Directive 2008/115/EC of the European Parliament and of the Council of 16 December 2008 on common standards and procedures in Member States for returning illegally staying third-country nationals, *Official Journal of the European Union*, Article 3(1).

⁵⁷ Carling, J., 2023. The phrase ‘refugees and migrants’ undermines analysis, policy and protection. *International Organization for Migration* 61, pp. 399-403.

also from additional protection recognised to migrants. This is the ‘inclusivist approach’ and has been followed by the International Organisation for Migration (IOM) and some?! academics.⁵⁸ For example, the IOM defines migrants as persons who have moved away from their ‘usual place of residence’, whether within a country or across an international border temporarily or permanently, for a variety of reasons’.⁵⁹

In contrast, the residualist approach understands the term migrants as referring to people who have moved to another country for any reason other than to seek international protection. The residualist approach is advocated for by the United Nations High Commissioner for Refugees (UNHCR). According to the UNHCR, refugees are *not* a subcategory of migrants. Instead, migrants are the residual, highly diverse group of all people on the move excluding refugees. In its glossary of terms, the UNHCR notes:

“UNHCR recommends that —except in very specific contexts (notably statistical: see below)— the word migrant should not be used as a catchall term to refer to refugees or to people who are likely to be in need of international protection, such as asylum-seekers. To do so risks undermining access to the specific legal protections that States are obliged to provide to refugees.”⁶⁰

Interestingly, the inclusivist definition of migrants seems to have been the preferred one within the UN system beyond the UNHCR.⁶¹ Still, the UNHCR has successfully promoted a redefinition

⁵⁸ Carling, J., 2015. Refugees are also Migrants. And All Migrants Matter. *Border Criminologies Blog*. Available at: <http://bordercriminologies.law.ox.ac.uk/refugees-are-also-migrants/>.

⁵⁹ United Nations. (1998). *Recommendations on Statistics of International Migration*. Department of Economic & Social Affairs Statistics Division Series M, No. 58.

⁶⁰ UNHCR master glossary of terms. Available at: <https://www.unhcr.org/glossary>.

⁶¹ Several Studies of the UN understand migrants as an umbrella term for refugees as their analysis includes them as well. See for example, the 2025 study of the UN Special Rapporteur on Migrants on Externalization of migration governance and its effect on the human rights of migrants (A/80/302) where by externalisation of migration governance, the Special Rapporteur includes asylum cases. Also, the 2025 study of the UN Special Rapporteur on Freedom of Religion or Belief of people on the move (A/80/205) where she analyses issues

with a very successful influential media strategy.⁶² It even launched a major campaign backed by celebrity advocates using the tagline ‘word choice matter’ to promote the distinction between migrants and refugees and campaign that refugees are not migrants.⁶³ The campaign succeeded in that media as well as most academic papers were increasingly using the expression ‘migrants and refugees’, emphasising the intended distinction.⁶⁴ Still, the IOM leadership maintained, until 2018, an inclusivist definition of migrants, which is now losing strength. Since 2019 when the IOM glossary on migration was released, the IOM did not fully engage with the distinction.⁶⁵

Our position in relation to the debate regarding the scope of the term ‘migrant’ is to advocate for the inclusivist approach to be used in predictive technologies. We understand migrants as people on the move, a definition that includes refugees.⁶⁶ We use the term migrants to refer to individuals who have passed international borders, moving away from the country of origin and citizenship temporarily or permanently, for a variety of reasons. We believe that using an umbrella term is important because migrants, whether refugees, economic migrants or else, all move across borders and by reason of this migration, they all face *some* similar human rights challenges, such as challenges to non-discrimination on the basis of their status, their race and their socio-economic rights. In this respect, we need the umbrella term, that of the ‘migrant’, to denote their movement through international borders, while using other more specific terms, such as, refugees, asylum seekers, to denote additional, existing protections. In particular, the term ‘migrants’ also includes recognized or non-recognized refugees who might have applied to receive international protection or not. We

relating both to migrants and refugees. And the 2023 study of one of the present authors, Xanthaki, UN Special Rapporteur in the field of Cultural Rights on Migration and Cultural Rights ([A/HRC/52/35](#)).

⁶² Crisp, J., 2020. UNHCR at 70: An Uncertain Future for the International Refugee Regime. *Global Governance* 26(3), pp. 359-368.

⁶³ Hartley, E., 2015. UNHCR: ‘Words matter’ Campaign Sees celebs explain difference between refugees and migrants’. Posted in Huffington Post. Available at: https://www.huffingtonpost.co.uk/2015/09/28/refugee-crisis-celebrities-join-wordsmatter-campaign-to-show-solidarity-with-displaced-persons_n_8205806.html.

⁶⁴ By 2020, the phrase ‘refugees and migrants’ was used 20 times more often than a decade earlier. See Carling, J., 2023. *op.cit.*, fn 57, p. 401.

⁶⁵ Sironi, A., Bauloz, C., and Emmanuel, M. (eds), (2019). *Glossary on Migration*. International Migration Law, No. 34. International Organization for Migration (IOM), Geneva, Switzerland.

⁶⁶ Carling, J., 2016. The end of migrants as we know them?. *Maastricht: UNU-MERIT United Nations University, Maastricht*. Available at [UNU-MERIT » The end of migrants as we know them?](#)

recognise that such a broad term includes variant groups of people who have moved across border with various legal entitlements depending on whether they are also recognised refugees or asylum applicants and unrecognised refugees.

Maintaining a linguistic distinction between migrants and refugees inadvertently undermines migrants, and might have negative consequences for ‘policy, analysis, and people on the move’, which defeats the proclaimed objectives of developing such technologies, namely to help migrants.⁶⁷ An inclusivist definition of migrants sets a more sensitive tone towards migratory movements because it recognises that any migrant may have an important reason for leaving the state or origin which does not fall within the grounds of the 1951 definition; or may even have a well-founded fear of gross persecution and be entitled to international protection as a refugee. So, any migrant might *also* be a refugee or a victim of trafficking, for instance.

A residualist, exclusivist approach fails to capture the rich and often overlapping nature of migrant categories. First, the proclaimed focus on forced and voluntary move does not reflect the current realities: for many migrants their move from their country is forced, just not because of persecution but because of on-going harsh realities, violations of socio-economic rights, medical emergencies etc. Second, the distinctions are evolving and changeable. For example, asylum seekers, being unrecognised refugees, may be considered even by themselves and treated by the host state as migrants if they apply for international protection after having entered the territory of the state using a work permit or a study visa. So, even though they are registered as documented regular migrants by the state that permitted their entry, residence or work within its territory, they may be in reality unrecognised refugees.⁶⁸ Their official status will only change as soon as they apply for refugee status,

⁶⁷ Carling, J., 2023. *op.cit.*, fn 57.

⁶⁸ Xanthaki, A. (2022) Undocumented migrants, refugees and asylum seekers: Can minority rights law stabilise the unsettled order?, in: *Minority Rights and Liberal Democratic Insecurities: The Challenge of Unstable Orders*. A-M. Biro, and D. Newman (Eds.) pp. 99 – 116, Routledge, Oxfordshire, United Kingdom.

but this will only be declaratory. Categorisation and clear lines of distinction do not really capture these multifaceted social realities.

We need to think more carefully about the use of categories, and the politicised undertones of constructed delineations in the context of Europe's 'migration crisis'.⁶⁹ The dichotomy between migrants and refugees carries a potentially harmful labelling impacting on the legitimacy of migrants' subsequent claims to international protection. This could also be used to justify policies of containment and externalisation that may be harmful to migrants. As it became clear during the so-called crisis of 2015–2016, the terms 'refugee' and 'migrant' are associated with divergent degrees of sympathy or hostility, respectively, among the public.⁷⁰ This might explain the critique of UNCHR towards an inclusivist approach⁷¹ that associates the subjects of their work with a definition that includes migrants, towards which the public had been far from sympathetic. Sadly, the residualist distinction of 'migrants or/and refugees' when adopted, campaigned and widely reproduced by the UNHCR, legitimised the existing migrant-phobia and had a rather harmful effect for the term 'migrants' which was subsequently usurped by right-wing xenophobic discourse.⁷² Therefore, it makes sense to allow an inclusive approach and maintain an umbrella term in addition to specific terms. This does not of course jeopardize the further needs and protection that refugees have and enjoy under the refugee law. A broad approach that understands that every migrant might *also* be a refugee is essential for a humane migration policy-making and border management that can otherwise only

⁶⁹ Crawley, H., and Skleparis, D., 2017. Refugees, migrants, neither, both: categorical fetishism and the politics of bounding in Europe's 'migration crisis. *Journal of Ethnic and Migration Studies* 44(1), pp. 48–64.

⁷⁰ Coninck, D.D., 2019. Migrant categorizations and European public opinion: diverging attitudes towards immigrants and refugees. *Journal of Ethnic and Migration Studies* 46(9), pp. 1667–1686; Eberl, J. M., et al., 2018. The European media discourse on immigration and its effects: A literature review. *Annals of the International Communication Association* 42(3), pp. 207–223; See also Crawley, H., 2017. *op.cit.*, fn 69.

⁷¹ See for a repeated campaign; UNHCR, 2015. UNHCR viewpoint: 'Refugee' or 'migrant' – Which is right?. UNIS/INF/513. Available at: <https://www.unhcr.org/uk/news/stories/unhcr-viewpoint-refugee-or-migrant-which-right>.

⁷² Lazović, V., 2017. Refugee crisis in terms of language: from empathy to intolerance. *British and American Studies* 23, pp. 197–206.

approach migrants as a threat for border security rather than as individuals, some of whom might need protection.

The generic term ‘migrant’ also refers to both ‘regular’ and ‘irregular’ migrants. The latter is also a contested term, used to refer to undocumented migrants. Unfortunately, even in official EU documents, we sometimes still find the term ‘illegal migrant’. Legally and ethically, an act can be legal or illegal, but a person cannot. And most importantly, a person fleeing their home country must not be penalised for not having their travel documents on them, as the state from which the person flees, might even refuse to issue such documents.⁷³ So, a refugee who does not possess travel documents at the stage of crossing borders is only seen by state authorities as a migrant, which showcases the blurred lines among categories and the need to maintain an inclusivist approach. Plethora of terms and lack of consistency affects predictions’ accuracy. Subscribing to either approach would ensure consistent term use and enhance accuracy. However, the inclusivist approach would be preferable to improve terminological consistency. Furthermore, if predictive tools are meant to boost humanitarian preparedness, support integration, and help migrants, an inclusivist approach avoids dangerous political undertones. Choosing the inclusivist approach may not necessarily improve accuracy compared to the residualist one, but it would eliminate harmful and misleading dichotomies between categories of migrants.

Our experience in the ITFLOWS project suggests that technical experts will not be able to capture the intricacies of overlapping classifications. For example, the data gathered only focused on ‘Monthly asylum applications data used as variable of prediction’ as gathered at official application points, while promising ‘migration predictions’. However, this completely ignored the clandestine routes which have been very common in the entry points of Europe. Failure to include undocumented migrants in data collection leads to an inaccurate picture of migration flows, which in turn affects the accuracy of

⁷³ Convention Relating to the Status of Refugees, opened for signature July 28, 1951, 189 UNTS 137, Article 31.

migration predictions. Furthermore, it ignores socio-economic and other issues these persons must cope with. Yet, incomplete results can be helpful for NGOs in need for some estimation of what to expect even though exact numbers cannot be attained as undocumented migrants cannot be accounted for. Our article wishes to shed light on these limitations so that designers of tools forecasting migration are clear about them.

4 Divergent Legal Definitions on Refugees

The first part of this article explained the problem: the divergence of different disciplines on the use of terms to identify people on the move has been rather unexplored; yet it affects the accuracy of results regarding migration prediction. First, we zoomed in the definition of a migrant. This section focuses on the definition of a refugee.

Similar to the definition of the term 'migrant' addressed above, the definition of the term 'refugee' for prediction reasons is an equally difficult undertaking. Divergent legal approaches and different uses equally cause inaccuracy. The bone of contention here is whether the term 'refugees' includes unrecognised refugees and how to reconcile a broad approach with statistical needs. Difficulties arise from some European bodies' databases practice because the way they define refugees for statistical purposes diverges from the jurisprudence of the ECtHR, which favors the inclusion of non-recognised refugees in the category of refugees.⁷⁴ In particular, as mentioned earlier, Eurostat does not include in the category of asylum seekers those who have not yet applied for asylum; let alone allowing asylum seekers in the category of refugees. This is problematic when it comes to representing realities and producing predictions.

⁷⁴ *Hirsi Jamaa and Others v Italy* [GC], App No. 27765/09 (ECtHR, 23 February 2012).

The definition of 'refugee' in Article 2(d) of the EU Qualification Directive is anchored in the 1951 Refugee Convention, together with its subsequent protocols. According to the Convention, a refugee is any person who

'owing to well-founded fear of persecution for reasons of race, religion, nationality, membership of a particular social group or political opinion, is outside the country of his nationality and is unable or, owing to such fear, is unwilling to avail himself of the protection of that country; or who, not having a nationality and being outside the country of his former habitual residence as a result of such events, is unable or, owing to such fear, is unwilling to return to it.'

The temporary and geographical restrictions have been lifted by the 1967 Protocol. All signatory states to the Convention are bound by the refugee definition. So, this is a universal definition, as far as the signatory parties are concerned. The EU Qualification Directive (2011/95/EU), Article 2(d) has reproduced this definition with the difference that the EU law definition excludes EU nationals as all EU Member States are considered safe countries.

An important element which -although positive- leads to a grey area is that the categorisation of a refugee as such does not depend on a state decision, but on whether they fulfil the criteria of the Refugee Convention. Under the prevailing interpretations of both international and European law,⁷⁵ a person is considered a refugee as soon as they meet the relevant criteria, whether or not they have been formally recognised as a refugee. This would necessarily occur prior to the time at which their refugee status is recognised. A person does not become a refugee because of recognition, but rather

⁷⁵ UNHCR, (1979). *Handbook on Procedures and Criteria for Determining Refugee Status under the 1951 Convention and the 1967 Protocol relating to the Status of Refugees*. HCR/IP/4/Eng/REV.1, para 28; Council of the European Union, 2011. Directive 2011/95/EU of the European Parliament and of the Council of 13 December 2011 on standards for the qualification of third-country nationals or stateless persons as beneficiaries of international protection, for a uniform status for refugees or for persons eligible for subsidiary protection, and for the content of the protection granted (recast). *Official Journal of the European Union* 337/9-337/26. Recital 21.

is recognized because they are a refugee as they meet the criteria. Including in statistical databases only refugees who are ‘officially recognised’ or have formally lodged an asylum application does not reflect the jurisprudence of the ECtHR in *Hirsi Jamaa* that favoured the inclusion of non-recognised refugees in the category of refugees in general. But this raises further questions stemming from the difficulty of a statistician working with a lawyer: how can data make legal judgments on whether one person is a ‘refugee’ who has just not yet been recognised by the state as such? It is impossible to reflect such accurate categorisations in statistical data that feed predictions.

Understanding these blurred lines is important. The UNHCR have incorporated this issue in their work by making the distinction discussed above between ‘recognised’ and ‘non-recognised refugees’. The UNHCR Glossary notes:

‘Sometimes—notably in statistical contexts—the word refugee is used to designate individuals or groups who have been formally recognized by States or UNHCR as entitled to refugee status following an asylum or other status-determination procedure. When this limited nonlegal meaning is intended, it should be clearly indicated. The clearest designation in such contexts is *recognized refugee*.’⁷⁶

Any person who meets the eligibility criteria, but has not applied or applied and has not yet been granted asylum by a state is understood then as a ‘non-recognised refugee’ (to be distinguished from unsuccessful asylum applicants). The declaratory nature of a state decision is also stipulated in EU law as Recital 21 of the Qualification Directive states that ‘the recognition of refugee status is a declaratory act’.

Finally, there are some specific categories of asylum where one has to clarify whether they are included in the relevant data or not. The state can recognise complementary or subsidiary

⁷⁶ United Nations Economic and Social Commission for Western Asia (ESCWA), UNHCR and IOM, 2022. Situation Report on International Migration 2021: Building forward better for migrants and refugees in the Arab region. *ESCWA Publication E/ESCWA/CL2.GPID/2021/2*.

protection, in a form preferred by them, the level of which may not be equivalent to that of the Refugee Convention. The EU Qualification Directive, in particular, extends protection to subsidiary protection (art. 18), also called humanitarian asylum, in 3 situations: (a) the death penalty or execution; (b) torture or inhuman or degrading treatment or punishment of an applicant in the country of origin; (c) serious and individual threat to a civilian's life or person.⁷⁷ However, it is not clear that all databases follow the EU definitions: For example, it is not clear why 'environmental refugees' are in the migrant category in EMDAT database;⁷⁸ and it is not clear whether the ACLED database which monitors conflicts⁷⁹ makes a distinction between low tensions and fully fledged wars which may have an impact on the determination of someone as a refugee or a migrant.

It becomes rather obvious that what the UNHCR calls 'non-recognised refugee' contains some of the people often called 'asylum seekers' or 'asylum applicants', whose claims for international protection (either refugee or complementary protection) are awaiting for a decision on their submitted application.⁸⁰ In view of the declaratory nature of the refugee title, the UNHCR has noted that 'every refugee is, initially, also an asylum-seeker; therefore, to protect refugees, asylum-seekers must be treated on the assumption that they may be refugees until their status has been determined.'⁸¹ In light of the above, we can question how realistic is that the integrated data that technological tools use from a variety of sources, incorporate these important nuances and how accurate such technological tools are when accurate data is not available in a coherent manner.

⁷⁷ ITFLOWS D2.1 *op.cit.*, fn 39.

⁷⁸ The database is compiled from various sources compiling data on the occurrence and impact of mass disasters, including UN agencies, non-governmental organizations, reinsurance companies, research institutes, and press agencies. See, EMDAT database. Available at: <https://www.emdat.be/>

⁷⁹ ACLED Trendfinder database. Available at: <https://acleddata.com/#/dashboard>

⁸⁰ United Nations High Commissioner for Refugees (UNHCR), 2006. Master Glossary of Terms. Available at: <https://www.unhcr.org/glossary>.

⁸¹ Executive Committee of the High Commissioner's Programme, 1993. Note on International Protection: Submitted by the High Commissioner. *United Nations High Commissioner for Refugees (UNHCR)* UN Doc A/AC.96/815, 5.

5 Data Bias and Reliability

Along with the definitional discrepancies, an accurate prediction of migration may also be elusive because historical data might not exist, drivers of migration are often unpredictable and follow unexpected events while national records registering migration data can be incomplete.⁸² Furthermore, other reasons for inaccuracy point towards bias and prejudice, such as missing data on a particular group of people (i.e. women, children or LGBTQI+ people). This can result in predictions not accurately representing the flow, which undermines the success of humanitarian preparedness. Women tend to be inaccurately reflected in data, which translates into a gender bias in policy decisions and outcomes across a whole spectrum of civil, social, and economic rights.⁸³ This is purpose defeating, considering that better humanitarian and integration preparedness is a reason why we make predictions. Gender data bias is a generic problem. Yet, in the sphere of technology, that is still an uncharted territory without tested structures of liability and protection, the danger of gender data bias can be exacerbated. Awareness of this limitation of forecasting tools could result in planning around the findings in a complementary way so that specific groups and their needs are specifically considered.

Consequently, doubts do exist on whether the endeavor of migration predictions is reliable enough as this technology has the potential to perpetuate or even exacerbate forms of structural discrimination because the data often reflects a 'racial' and 'ethnic' bias or contributes to

⁸² See also Report, Okyay, A.S., et al., 2021. Analysis on migration drivers and trajectories along the Eastern Mediterranean Route (South Central Asia & Middle East); Central and Western Mediterranean Routes and the Western Africa Route (North, West, and the Horn of Africa), and the Atlantic Route (South-Central America).

⁸³ Lau, P.L. (2024) AI gender biases in women's healthcare: Perspectives from the United Kingdom and the European legal space. in *YSEC Yearbook of Socio-Economic Constitutions 2023: Law and the Governance of Artificial Intelligence*. Moberg, A. and Gill-Pedro, E. (Eds.) YSEC 2023, pp. 1 - 18, Springer, Heidelberg, Germany.

stereotyping.⁸⁴ A report by the Office of the UN High Commissioner for Human Rights⁸⁵ has confirmed that AI surveillance operations tend to disproportionately monitor minority and marginalized communities, which fuels racial and ethnic stereotypes.⁸⁶ This is a reality to which we must not turn a blind eye, as it directly informs any emerging technology and its use. Any technology must be considered within the political, economic, and social context within which it was developed and the kind of data that have been used.

Political context is important as it shapes the driving forces of research projects, potentially affecting their agendas.⁸⁷ While researchers working on technological systems of migration predictions seem to have humanitarian reasons to develop their work,⁸⁸ this is often usurped by anti-migration agendas dominating policy and underpinning the funding of relevant research. The EU maintains a securitized view of migration and continues to invest in and prioritise support of security-focused tools.⁸⁹

Most often, anti-migration control agendas and control of mobility disguise behind humanitarian justifications. The states strive to increase their awareness of movement across their borders, which is a justified exercise of state sovereignty. This, often, however, leads to violations of parallel existing limitations on sovereignty deriving from international law. One can also notice an inconsistent and selective exercise of border and migration control that is welcoming to some while

⁸⁴ Forster, M. (2022). *Refugee protection in the artificial intelligence era: A test case for rights*. Royal Institute of International Affairs, London, United Kingdom. Available at: <https://doi.org/10.55317/9781784135324>.

⁸⁵ UN High Commissioner for Human Rights, (2021). *The right to privacy in the digital age: Report of the United Nations High Commissioner for Human Rights*. A/HRC/48/31. Available at: <https://www.ohchr.org/en/documents/thematic-reports/ahrc4831-right-privacy-digital-age-report-united-nations-high>.

⁸⁶ Achiume, E.T., 2020. Racial discrimination and emerging digital technologies: a human rights analysis: Report of the Special Rapporteur on contemporary forms of racism, racial discrimination, xenophobia and related intolerance. UN Human Rights Council A/HRC/44/57. Available at: https://promiseinstitute.law.ucla.edu/wp-content/uploads/2022/04/A_HRC_44_57-Racial-Discrimination-and-Emerging-Digital-Technologies.pdf

⁸⁷ Sánchez-Monedero, *op.cit.*, fn 11, pp 413-430.

⁸⁸ Suleimenova, d., & Groen, D., 2020. How Policy Decisions Affect Refugee Journeys in South Sudan: A Study Using Automated Ensemble Simulations. *Journal of Artificial Societies and Social Simulation* 23 (1) 2.

⁸⁹ European Commission. Communication from the Commission to the European Parliament, COM(2020) 605 Available at: [EUR-Lex - 52020DC0605 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/eli/other/2020/605).

hostile to others, with inclusionary and exclusionary effects at the same time.⁹⁰ Predicting future migratory movements reinforces the already powerful position of states and feeds their agency to control mobility. Despite the humanitarian preface of migration predictions, reinforcing control of mobility and border security is the disguised and least talked about reason behind funded projects delivered by researchers otherwise dedicated to the humanitarian justifications of the work. This is particularly the case in a broader context of migration technology and the securitised digitalization of borders.⁹¹ This is indicative of the infamous crimmigration trend,⁹² present in the field of EU immigration and asylum law whose spirit shapes migration control and management with a spill-over effect on migration predictions. Indeed, predictions, often conflating migration, asylum and criminality reinforce the trend of crimmigration, to the extent they are re-purposed with border security in mind and used by state authorities for this purpose. The danger of re-purposing such tools for border control purposes that can lead to human rights violations was raised by the open letter sent to the ITFlows consortium in September 2022. This is because forecasting tools might be mis-used to securitise migration and criminalise movement and solidarity with people on the move.⁹³ In this sense, research with good intentions 'would become an enabler of fundamental rights violations',⁹⁴ which is important for researchers to consider when they negotiate partnerships.

Achiume has warned about such a risk of digital technologies being 'deployed to advance the xenophobic and racially discriminatory ideologies', a risk that is omnipresent at times of populism.⁹⁵ The current political context across Europe, does not inspire confidence. Security and migration are often conflated, refugees who need protection are very clearly distinguished from migrants who are

⁹⁰ Mezzadra, S., and Neilson, B. (2013). *Border as Method, or, the Multiplication of Labor*. Duke University Press, p.7, Durham, North Carolina, USA.

⁹¹ Molnar, P. (2024). *The Walls Have Eyes: Surviving Migration in the Age of Artificial Intelligence*. The New Press, New York, USA.

⁹² Amelung, N., 2021. Crimmigration Control' across Borders: The Convergence of Migration and Crime Control through Transnational Biometric Databases. *Historical Social Research* 46(3), pp. 151–77.

⁹³ Open letter, *op.cit.*, fn 30.

⁹⁴ Ibid.

⁹⁵ Achiume, E.T., 2020. Contemporary forms of racism, racial discrimination, xenophobia and related intolerance: Note by the Secretary-General. UN Human Rights Council, UN Doc. A/75/590.

being demonised by populist, anti-migration agendas. It would be naïve to expect that digital technologies might escape from the xenophobic and discriminatory ideologies. As migrants are often portrayed as a security threat in media, political and policy discourse, there is a high risk that migration predictions could also be used to support security and law enforcement purposes resulting to the criminalisation of migration.⁹⁶ Migration prediction is not desirable when driven, funded, informed by migration prevention and control and when shaped by crimmigration agendas.

6 Legal Developments

Technological tools for the purpose of migration governance often frame migrants as a threat that needs controlling rather than as persons that are often marginalised.⁹⁷ So, it is no surprise that predictions risk jeopardising migrants' guarantees to exercise several fundamental rights,⁹⁸ including the right to asylum, the right to freedom from discrimination, the protection of private life and personal data and potentially the principle of non-refoulement. Predictions may lead to classifying people into categories based on a risk-assessment informed by bias and racial profiling which is deeply concerning.⁹⁹ This might, in turn, lead (or contribute) to refouling unrecognised refugees to their country of origin or an unsafe third country where they may be re-subjected to persecution.¹⁰⁰ Moreover, migrants' digital agency is precarious, with migration technologies posing dangers on their right to privacy and capacity to exercise informed consent.¹⁰¹ Besides, gender or race data bias might

⁹⁶ Bircan T., and Korkmaz, E., 2021. Big data for whose sake? Governing migration through artificial intelligence. *Humanities and Social Sciences Communications* 8(241), p. 1, 3-4; See Molnar, *op.cit.*, fn 4; See Beduschi, 2022. *op.cit.*, fn 29.

⁹⁷ Bircan T., *ibid.*

⁹⁸ Molnar, P., 2019. New technologies in migration: Human rights impacts. *Forced Migration Review* 61, p 7.

⁹⁹ ITFLOWS Report D.2.3, *op.cit.*, fn 32. pp. 33-48; Ajana, B., 2015. Augmented borders: Big Data and the ethics of immigration control. *Journal of Information, Communication and Ethics in Society* 13(1), pp. 58-78

¹⁰⁰ Forster, *op.cit.*, fn 84.

¹⁰¹ Lintner, C., 2024. 'They must know their rights'— Reflecting on privacy, informed consent and the digital agency of asylum seekers and refugees in border contexts. *International Migration* 62(5), p. 71-87.

perpetuate existing inequalities that reproduce harmful practices,¹⁰² which is likely to encroach upon freedom from discrimination.

All in all, predictions do pose risks of violations of fundamental rights in a context of a well-recognised securitisation policy landscape.¹⁰³ Recent developments on reforming EU asylum law do not inspire trust in the usage of migration predictions for humanitarian reasons and further emphasise the need to be cautious. For example, the New Pact on Migration and Asylum seems to restrict access to the EU territory for all migrants, including refugees, by containing, *inter alia*, a new regulation on pre-entry screening of third-country nationals at EU external borders.¹⁰⁴ This is another way of fortifying Fortress Europe and poses serious challenges to the exercise of the right to asylum. It relies on the well-established trend of externalisation at the borders,¹⁰⁵ shaped by the narrative of emergency. Nevertheless, migration predictions could have a protective function if used to hold authorities accountable for their omission to save lives of migrants in danger, which they knew existed by having access to knowledge provided by migration forecasting.¹⁰⁶

In similar vein, the EU AI Act does also not inspire confidence in protecting the vulnerable groups of migrants, including refugees. The regulatory choices made in the EU AI act in the sphere of asylum and migration offer no reassurances. Although the Act bans certain high-risk AI practices (Article 5) that can be harmful, abusive and in contradiction with EU values, the Act does not ban practices that aim to forecast or predict trends related to migratory flows and border crossings. Under the EU AI Act, migration flow predication tools, as such, are no longer classified as high-risk and indeed

¹⁰² Beduschi, A., *op.cit.*, fn 29.

¹⁰³ European Commission, (2022). *The Use of Digitalisation and Artificial Intelligence in Migration Management*: EMN-OECD Inform. Available at: <https://www.oecd.org/migration/mig/EMN-OECD-INFORM-FEB-2022-The-use-of-Digitalisation-and-AI-in-Migration-Management.pdf>.

¹⁰⁴ European Union, 2024. Regulation (EU) 2024/1356 of the European Parliament and of the Council of 14 May 2024 introducing the screening of third-country nationals at the external borders and amending Regulations (EC) No 767/2008, (EU) 2017/2226, (EU) 2018/1240 and (EU) 2019/817 PE/20/2024/REV/1 OJ L, 2024/1356, 22.5.2024.

¹⁰⁵ Xanthopoulou, E., 2024. *op.cit.*, fn 34, pp. 108-135.

¹⁰⁶ Guild, E., & Mitsilegas, V., 2022. The duty of the EU to criminalize failure to rescue at sea, Odysseus Network: EU Immigration and Asylum Law and Policy. Available at: <https://eumigrationlawblog.eu/the-legal-duty-of-the-eu-to-criminalise-failure-to-rescue-at-sea/>.

references to trends, forecast and flow has been removed. Interestingly, the adopted act removed the provision added by the Parliament's draft compromise amendment that recognised the high risk of using AI in migration predictions.¹⁰⁷ So, the final act took a more conservative and less rights-oriented approach. Therefore, the current legal frameworks do not inspire with sufficient confidence that the use of predictions will not be risky for refugees and other migrants.

At an international level, the Council of Europe's Framework Convention on Artificial Intelligence and Human Rights, Democracy, and the Rule of Law was adopted by the Committee of Ministers on 17 May 2024 and subsequently opened for signature on 5 September 2024. The convention is indeed the first international legally binding instrument aimed at ensuring that AI systems are developed and utilized in a manner consistent with human rights. It does bind public bodies to the principles of equality and non-discrimination, the principles of human dignity, transparency, accountability, and safe innovation. Initial signatories included Andorra, Georgia, Iceland, Norway, the Republic of Moldova, San Marino, the United Kingdom, Israel, the United States of America, and the European Union. Yet, Article 3.2 reads:

A Party shall not be required to apply this Convention to activities within the lifecycle of artificial intelligence systems related to the protection of its national security interests, with the understanding that such activities are conducted in a manner consistent with applicable international law, including international human rights law obligations, and with respect for its democratic institutions and processes.

So, States have the right to use such technologies 'for the protection of national security interests' which as securitization has overtaken immigration may be argued by States that it includes migration prediction tools. Also, the third paragraph of Article 3 imposes a significant limitation to the

¹⁰⁷ European Parliament, (2023). DRAFT Compromise Amendments on the Draft Report Proposal for a regulation of the European Parliament and of the Council on harmonised rules on Artificial Intelligence (Artificial Intelligence Act) and amending certain Union Legislative Acts: COM(2021)0206 – C9 0146/2021 – 2021/0106(COD)).

scope of the AI Framework Convention, by excluding “research and development activities related to artificial intelligence that are not yet available for use.” Hence, the provision does not allow for an initial control on the compliance of the technologies with human rights. This unfortunately also significantly weakens the application of the convention in matters of migration.

7 Conclusions

The article poses crucial but unexplored questions as to the very reliability of predictions of migratory flows and postulates a call for caution. We argue that migratory flows’ unpredictability raises important doubts on whether such predictions are reliable in the first place. A far-reaching misunderstanding of legal terms and their varying use, even within the legal community, might result in erroneous forecasting. This is either due to confusion or is part of a political choice to completely distinguish refugees from the umbrella term of migrants. The inconsistent use of legal definitions, the divergent opinions on terminology within the legal community, and the lack of common language in interdisciplinary communication leads to inaccuracy. This is further reinforced by various data biases that defeat the purpose of using accurate predictions for better humanitarian preparedness.

This argument is not without qualifications. The forecasting of future migratory routes using agent-based models¹⁰⁸ was indeed found to be useful by credible organisations such as Save the Children.¹⁰⁹ Forecasting under a different political climate in isolation from governmental pressures, used by trusted humanitarian actors and in a manner that follows a consistent language across the board of stakeholders could indeed offer solutions to trusted humanitarian actors. Despite the warnings of academic and field experts for caution considering the problematic nature of generic forecasting of migration,¹¹⁰ the European Commission and several agencies (such as the European Asylum Support Office (EASO), the European Union Agency for Asylum, the European Border and Coast Guard Agency (Frontex)) seem invested in developing such predictions tools uncritically. This is why

¹⁰⁸ The models are explained in section 1.2.

¹⁰⁹ DiRAC, Save the Children. Available at: https://dirac.ac.uk/innovation_placement/save-the-children/.

¹¹⁰ Carammia, M., 2020. *op.cit.*, fn 19, p. 2.

resetting expectations is important and this is precisely our aim in this contribution by unearthing persisting definitional discrepancies that spill over the reliability of forecasting.

Finally, and importantly, legal definitions bring with them a specific lens of possible protection. Migrants, irrespective of the reasons why they have migrated, are disadvantaged because of their distinction to the rest of the society and the existing asymmetries of power. The 'fear of the Other' that they experience, the racism and stereotypes they face, and their need for integration and flourishing in the host state are the same for all types of migrants as people on the move. And although the reasons they left their states of origin distinguishes them from refugees, we should not shun away from the truth: often, irregular migrants suffered fear regarding their lives in ways equally violent to the fear of persecution. Irregular migrants have often faced "an existential threat to which they have no access to a domestic remedy or resolution".¹¹¹ Their stories before they arrive to the host state are often not too different either. Their ways of reaching the host countries and the traumas they have suffered are very often similar. In similar ways, the long-term quality of life of refugees has been shielded by focusing on urgent asylum relating rights, such as the right to asylum, the right to security and prohibition of non-refoulement. These have taken precedence -as they should- because of the urgency of the violations. Viewing refugees also as migrants allows for long-term goals, such as equality, participation in the cultural life, and socio-economic fulfilment, to be exposed, as they are for -other- long term migrants.

It is important that results of technological tools on migration prediction be received critically and such tools are used only after their reliability and their 'added value' is discussed and determined. Only then shall these tools assist rather than hinder the development of reliable strategies and policies for furthering the well-being of migrants and the societies in which they find themselves.

¹¹¹ Betts, A., 2010. Survival Migration: A New Protection Framework. *Global Governance* 16(3), 361-382. p. 362.

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Competing interest

None.