

Alejandro Mosquera Botello

AI and Migration Management: an Exploratory Study of Public Sector Applications and Ethical Implications

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Supervisor: Prof. Dr. Anu Masso

Presented by: Alejandro Mosquera Botello

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Content

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Abbreviations

ADS	automated decision-making systems
AI	Artificial Intelligence
Annie™:	Annie™ MOORE (Matching for Outcome Optimization and Refugee Empowerment)
DEDA	Data Ethics Decision Aid
DRC	Danish Refugee Council
EU	European Union
EUAA	European Agency for Asylum
GDPR	General Data Protection Regulation
HIAS	Hebrew Immigrant Aid Society
ICT	information and communication technologies
IPL	Immigration Policy Lab
PFI	Push Factor Index
RPA	Robotic Process Automation
STS	science and technology studies
US	United States
WPI	Worcester Polytechnic Institute

1. INTRODUCTION

The first *Homo Sapiens* originated 200.000 years ago in the horn of Africa (Cann et al., 1987). Further studies have concluded that the first human beings migrated to Europe and Asia around 55.000 and 70.000 years ago (Blakemore, 2019). Thousands of years after those first migration waves, modern humans keep leaving their places of origin and climate change, conflicts, or economical instability have become the fundamental causes of the nowadays migration flows (UNHCR, 2024). For at least 50,000 years, human beings have continuously migrated across the globe. This phenomenon, deeply embedded in human history, has persisted over time and shows no indication of disappearing, as mobility remains an inherent aspect of human societies. The current crises associated with human mobility require modern states to create migration governance strategies to manage the rising international migration trends.

Migration is such a topical challenge that according to the IOM at least 300 million people were living in a country different from their place of origin in 2024 (McAuliffe &. Oucho, 2024), and the UNHCR reported at least 83 million people were forcibly displaced between 2005 and 2023, with 75% of them seeking refuge in low- and middle-income countries (UNHCR, 2024). One of the most recent examples of the migration pressure on governments and humanitarian agencies comes from the refugee crisis in Europe during 2015 and 2016, mainly triggered by the conflict in Syria (Marbach et al., 2025). The European experience with this migration wave demonstrated the complexity of a phenomenon that is highly context-dependent, where causal factors interact non-linearly and in which their impact over time is profoundly variable (Carammia et al., 2022).

Moreover, other episodes around the world have exhibited the diversity of drivers of migration waves, and how their effects and interactions vary significantly both between and within specific migration flows. Besides the inherent complexities of migration trends, the advent of the crisis exposed the inadequate preparedness of European regional and national institutions in handling such humanitarian emergencies (Carammia et al., 2022). The impact of the migration crises during the mid-2010s changed the perspective of migration governance as a topic of special relevance. The reactive, uncoordinated and ineffective response of the European authorities to the crises (Carammia et al., 2022; Angenendt et al. 2023), changed the political landscape, pressuring governments and policymakers to strengthen their measures to deal with migration waves. In that sense,

the rise of migration as a global concern demands the development of new migration policy frameworks strategies (Robinson, 2018).

The rapid digitalization of research and technology, along with the exponential expansion of data, has significantly transformed migration research (Angenendt et al., 2023). Alternative research methods from statistics, mathematics, and computational science are increasingly being integrated into social sciences, enabling researchers and practitioners to anticipate future scenarios and make data-based decisions (Carammia et al., 2022). The exponential increase in computational capacity and the proliferation of extensive datasets has catalysed the present resurgence of scholarly and practical interest in AI (Beduschi, 2021).

By combining innovations in big data, machine learning, and agent-based modelling with social science methodologies, it is now feasible to detect migration patterns that conventional approaches might overlook (Carammia et al., 2022). In particular, new quantitative prediction tools based on AI and predictive analytics have raised high expectations in the European context for improving migration forecasting (Angenendt et al., 2023). The use of AI-based models is expected to bring a qualitative leap in precision and reliability, with the underlying assumption that, in theory, future migration events could be anticipated in detail if sufficient data and computational capacity is available (Carammia et al., 2022).

In the European context, EU institutions and non-EU governments have recognized the potential of new technologies for designing and testing different migration policy frameworks to enhance border security, facilitate refugee integration, and improve humanitarian aid (Bither & Ziebarth, 2021). This is reflected in the growing interest in quantitative migration forecasting and the increasing funding for research projects in this sector (Angenendt et al., 2023). Some of these technologies are already in use, such as facial recognition at airports to enhance border control and database systems for refugee management. Additionally, AI-based tools are being explored to support decision-making processes in visa applications, assessing candidates based on risk factors and migration patterns (Bither & Ziebarth, 2021).

At the operational level, the aim of these tools is to provide relevant information to local authorities involved in receiving and integrating migrant populations of refugees and

asylum seekers. As a key example of AI-supported migration management, the EU Agency for Asylum (EUAA) has developed the Push Factor Index (PFI), which compiles information on disruptive political, economic, and social factors on a country-by-country basis and refers to the main factors that trigger migration flows in countries of origin (Angenendt et al., 2023). EUAA employs big data on worldwide media reports to measure the frequency of such events, which are chosen and weighted according to the degree of the effect they are projected to have on asylum-related migration (European Asylum Support Office, 2020).

While migration inherently involves a degree of uncertainty (Carammia et al., 2022), these indicators offer a foundation for analysing its underlying drivers within specific contexts. Their relevance has grown in parallel with advances in data and information technologies, which have facilitated the rise of tools grounded in machine learning, and AI. The unpredictability of asylum-related migration poses a significant challenge for host countries, as fluctuating arrivals complicate long-term integration planning.

Existing migration forecasting models often struggle with uncertainty due to dynamic, country-specific drivers and data limitations. While forecasting tools are essential for policy preparedness, their limitations highlight the need for more robust, real-time data-based approaches, not only to predict migration flows but also to enhance refugee allocation and integration strategies (Carammia et al., 2022; Bansak et al., 2018).

In that sense, successful inclusion of immigrants is a prerequisite for social cohesion and economic progress (Bircan et al., 2023, p. 1). In this context, algorithmic placement tools offer a promising alternative by leveraging historical and contextual data to generate evidence-based allocation decisions. Unlike conventional placement frameworks, which often neglect synergies between refugee personal background characteristics and geographic local conditions, these AI-based models seek to maximize integration outcomes by aligning individual characteristics with optimal resettlement locations (Bansak, 2018; Ferwerda et al., 2022). However, the success of these tools is contingent upon access to high-quality, diverse datasets, as poor data quality can reinforce biases and misallocation risks (Carammia et al., 2022). Consequently, ongoing efforts to enhance data collection and integration across migration governance systems are critical to ensuring both the effectiveness and fairness of AI-assisted refugee placement.

Although the launch of ChatGPT in 2022 raised widespread enthusiasm around AI (Vallance, 2022), interest in AI-powered algorithmic tools for migration management predates this recent wave. For instance, Bansak et al. (2018) proposed an algorithmic allocation model to enhance refugee integration as early as 2017. Similarly, Annie™ MOORE has been recognized as the first machine learning-based software designed to optimize refugee resettlement outcomes in the United States (US) (Delacrétaz et al., 2020). These initiatives demonstrate that efforts to include algorithmic approaches within migration policy frameworks have been evolving for nearly a decade. A more recent example is GeoMatch, a predictive modelling tool developed by the Immigration Policy Lab (IPL) which is an academic institution based at Stanford University and ETH Zurich and committed to advancing innovation in immigration policy through AI-based solutions.

The GeoMatch algorithmic recommendation tool uses historical data on settlements and labour market outcomes to predict labour market integration in each settlement location. GeoMatch identifies synergies between refugees' background characteristics, the settlement location of the hosting country, and their integration outcomes (e.g. employment, earnings, or other available outcomes) and then uses these patterns to generate optimal matches for incoming individuals and families. According to IPL, with GeoMatch settlement officers are able to receive AI-based location recommendations for incoming cases, which can be considered holistically as part of the existing decision process (Ferwerda et al., 2022).

Building on these developments, governments worldwide are increasingly investing in the development of new technology solutions, while tech companies drive the commercialization of AI-based solutions to meet growing policy demands (Bircan & Korkmaz, 2021). This trend is evident in Europe, where countries like Norway, Sweden, Switzerland, and the United Kingdom have been early adopters of systematic migration forecasting (Bijak et al., 2017). Moreover, institutional efforts at the EU level have fueled research on migration prediction tools, with major funding allocated through programs such as Horizon 2020 and Horizon Europe, underscoring the importance of AI-supported migration governance (Angenendt et al., 2023).

Private sector collaborations have also played a role in these developments. For instance, IBM partnered with the Danish Refugee Council (DRC) to develop a humanitarian

migration tool (DRC, 2021), demonstrating how corporations influence AI-driven migration solutions. Similarly, GeoMatch emerged as an innovative AI-based allocation tool, designed not only to improve migrant integration outcomes but also as a marketable product for governments seeking to enhance their migration management systems (Ferwerda et al., 2022). However, AI-based applications for the public good remain limited, and their widespread adoption is still in early stages (Bircan & Korkmaz, 2021).

In this context, algorithmic tools like GeoMatch and Annie™ exemplify emerging efforts to operationalize AI within migration governance frameworks. These tools raise critical questions not only about their technical effectiveness, but also about their ethical, institutional, and practical implications. While the literature has examined the potential of predictive analytics for optimizing refugee resettlement and discussed the ethical concerns associated with AI in migration management, less attention has been paid to how these technologies are perceived by the stakeholders responsible for their design, implementation, and oversight. This thesis addresses that gap by examining the interplay between institutional readiness, ethical considerations, and human-AI interaction in the deployment of such tools, with particular attention to how these dynamics shape and constrain real-world implementation.

This comparative and exploratory qualitative study is guided by the following research question:

Main Research Question:

What institutional, technical, and contextual conditions enable the deployment of AI-based tools for migration management?

Subquestions:

1. How do public officials and AI developers understand the sociotechnical factors influencing the design and implementation of AI-based tools in the public sector?
2. How do public officials and AI developers perceive the impact of AI on bureaucratic structures and public sector decision-making?

Research objective:

To explore the role of AI in migration management through expert perceptions, institutional constraints, and the cases of GeoMatch and Annie™ MOORE as illustrative tools.

2. LITERATURE REVIEW

The growing adoption of data-based tools for public governance and migrant allocation has led to a proliferation of terminology, reflecting diverse methodological and conceptual approaches. This observation is supported by Molnar and Gill (2018), who note that while the term automated decision-making systems (ADS) is commonly used in policy discourse, in practice there exist a constellation of overlapping and interrelated terms referring to various technologies and their specific applications. Terms such as data-driven decision-support models, agent-based modelling (Angenendt et al., 2023), data-driven algorithmic assignment (Bansak et al., 2018), or AI-driven automated decision-making systems (Bither & Ziebarth, 2021) are often used interchangeably, despite carrying distinct connotations.

For instance, AI-based refugee placement models highlight the role of AI in optimizing resettlement decisions (Bither & Ziebarth, 2021), whereas data-based migrant allocation systems encompass a broader range of technologies, including statistical modeling and predictive analytics which are not limited strictly to AI. Considering that refugee placement models are a specific type of decision-support system (Bither & Ziebarth, 2021) and to avoid ambiguity, this analysis will use the terms “AI-based placement models” and “data-based placement models” interchangeably, defining them as tools that leverage historical data and predictive algorithms to enhance the integration of refugees and asylum seekers by aligning individual profiles with regional opportunities (Bansak et al., 2018), thus fostering more efficient and evidence-based policy implementation.

The rise in algorithmically mediated decision-making is not isolated to the migration policy field but rather part of a broader phenomenon often described as the algorithmic turn (Ajunwa, 2020). This concept captures the increasing reliance on algorithmic systems and particularly those based on machine learning and AI to enhance efficiency in decision-making across a wide range of domains. According to Ajunwa (2020), this turn reflects a sociotechnical shift in which automated decisions are embedded in everyday governance and organizational practices, even as regulatory and ethical frameworks struggle to keep pace with their rapid deployment. In the context of migration, the algorithmic turn underscores how data and AI-based tools have become central to shaping policy implementation and service delivery, raising important questions about their design, use, and impact (Ajunwa, 2020).

This technological evolution takes place within the broader framework of migration governance and migration management, two frequently interchanged and contested notions in international frameworks (Beduschi, 2021). While some scholars and policymakers use these terms synonymously, others distinguish them based on their scope and function. To enhance conceptual clarity and readability in this analysis, migration governance will be used for referring to the general policy and regulatory frameworks that guide migration processes at a strategic level, whereas migration management will denote the administrative and operational practices that implement these governance principles in practice.

Under this distinction, migration governance encompasses the legal frameworks, institutional mechanisms, and long-term policy strategies regulating human mobility, while migration management focuses on the logistics, administration, and short-term decision-making necessary for migrant resettlement (Robinson, 2018). Consequently, AI and data-based refugee placement models serve as pivotal instruments at the intersection of these two dimensions, bridging long-term policy objectives with real-time operational challenges.

2.1. The Promises of AI-Based Algorithm Models

The initial placement of refugees within a host country is a critical policy decision, significantly impacting their economic integration and self-sufficiency, which are fundamental for broader societal integration (Bansak et al., 2018). Therefore, the allocation mechanism for refugees could be seen as one of the first measures of integration policy (Blouchoutzi et al., 2022). Traditional migrant allocation models vary across host countries and are often shaped by resettlement procedures and policy frameworks that overlook the synergies between the personal background of the refugees and optimal geographic locations (Bansak et al., 2018).

In the US, refugees without prior connections in the country are assigned primarily based on the immediate capacity of local resettlement agencies, rather than through a systematic evaluation of local employment rates for comparable refugee profiles. In contrast, Switzerland applies a random and proportionate distribution system, implemented by the federal government to ensure a balanced fiscal and social burden among different regions

(Bansak et al., 2018). In the case of Norway, migrant allocation policies have relied on caseworkers who analyse individual cases and make placement decisions based on federal or regional guidelines and constraints related to the refugee and asylum seekers quotas assigned to each municipality (Ferwerda et al., 2022). According to Bansak et al. (2018), traditional migrant allocation frameworks are characterized by a lack of systematic data on refugee preferences and, critically, the need for extensive political coordination.

The emergence and consolidation of advanced technologies such as big data, machine learning, deep learning, and data science have transformed analysis and decision-making across various disciplines, especially in social sciences (Beduschi, 2021). In the field of migration management, the growing possibility to collect and analyse data has coincided with major migration crises, such as the Syrian war in 2015 and the Ukraine invasion in 2022, which have reshaped the political landscape and generated an urgent demand for more accurate information systems to manage migration flows (Angenendt et al., 2023). In this context, the convergence between technological advancements and the increasing need for improved migration management has driven the development of AI-powered and data-based decision-support systems as refugee placement models.

In this sense, the rising adoption of quantitative and computational methodologies in social sciences reflects and reinforces this trend, transforming the way integration policies are designed and implemented (Carammia et al., 2022). GeoMatch or Annie™, in particular, and refugee placement models in general, have emerged as key tools for leveraging historical data from previous cases to assess and rank the probability of successful economic integration for incoming refugees (Bansak et al., 2018; Delacrétaz et al, 2020; Ferwerda et al., 2022). These models aim to optimize migrant integration, particularly within the labour market, offering potential improvements over traditional approaches (Bansak et al., 2018). These distinct allocation strategies highlight a key challenge for future data-based allocation algorithms related to ensuring that AI-based placement models can be adapted into the existing migration policy frameworks and distribution policies while optimizing integration outcomes.

As improving the labour market integration remains a key policy objective, countries such as Norway (Ferwerda et al., 2022), Canada (Molnar & Gill, 2018), the United States (Ahani et al., 2021), and Switzerland (Bansak et al., 2018) have sought to implement data-based decision-support systems to optimize the allocation of refugees and asylum seekers.

These tools are particularly relevant during the initial placement phase, as they aim to reduce inefficiencies, lower costs, and alleviate institutional strain caused by conventional allocation procedures.

Ferwerda et al. (2022) conducted a retrospective simulation using historical data to assess the feasibility and impact of GeoMatch in Norway. The analysis revealed that refugees placed using GeoMatch could achieve significant salary increases, with projected earnings rising by 55%, which means from an average of 20,000 NOK to 31,000 NOK per month, under existing allocation constraints. On the other hand, in a scenario with fewer restrictions on the number of regional placements, estimated earnings reached 37,000 NOK per month, marking an 85% increase over the baseline. These findings suggest that a more flexible geographical allocation strategy could further enhance the economic outcomes of refugee placements (Ferwerda et al., 2022).

In a related study, Ahani et al. (2021) evaluated the performance of Annie™ for the U.S. resettlement context. Their findings align with those of GeoMatch, illustrating the potential of algorithmic tools to improve refugee integration outcomes through optimized geographic matching. Specifically, the model demonstrated that systematic, data-based placement could raise short-term employment rates for resettled refugees from approximately 30% to over 40%, even while adhering to locality-level constraints such as language availability, housing capacity, or medical services. These results underscore the value of algorithmic allocation as a practical mechanism for improving economic integration without compromising institutional feasibility or service equity.

A similar approach was previously explored by Bansak et al. (2018), an earlier version of GeoMatch was also simulated in the United States and Switzerland. The study compared traditional refugee placement methods, which relied on resettlement office capacity or random distribution, to a data-based algorithmic model that optimized refugee-location matches based on economic integration potential. The findings demonstrated that employment rates would improve from 34% under conventional assignment to 48% under algorithmic allocation, representing a 41% relative increase. Notably, the median refugee's probability of employment doubled, rising from 25% to 50%, highlighting the potential of data-based allocation to significantly enhance labour market integration. Furthermore, the algorithm improved employment prospects across all refugee groups,

including those least likely to find work, reinforcing its role as a scalable and effective policy tool for migrant integration (Bansak et al., 2018).

According to Bansak et al. (2018), the process of developing and training AI-based allocation tools and other data-based decision-support models for migration management is based on three key factors that influence refugee integration: the geographical context of the host country, the personal background characteristics of refugees and asylum seekers, and the synergies between geography and personal attributes. Personal backgrounds play a crucial role in determining the most suitable resettlement location for refugees. Research on data-based algorithms (Ahani et al., 2021; Bansak, 2018; Ferwerda et al., 2022) suggests that these tools leverage synergies between individual characteristics and geographic contexts to enhance economic integration.

While migrants with higher qualifications and strong language skills tend to succeed regardless of their assigned location, those with lower levels of education or limited prior work experience may benefit the most from algorithmic placement, as it helps identify optimal employment opportunities. This interaction between personal background and geographic factors is particularly evident in cases where language compatibility plays a role; for instance, French-speaking African migrants in Switzerland may experience better integration outcomes if placed in French-speaking cantons (Bansak et al., 2018).

Building on this, quantitative findings from Ferwerda et al. (2022) provide further insight into how AI-based allocation models perform across different refugee profiles. The analysis shows that the machine learning model used to predict asylum seeker earnings based on personal background characteristics and assigned locations is highly accurate for most of the population but struggles with high-earning outliers. Specifically, the model tends to underestimate earnings for individuals with exceptional earning potential in the top 10% of income (90th percentile or higher). This modelling error is likely due to missing variables such as unobserved skills, prior work experience, or other forms of human capital (Ferwerda et al., 2022). These findings suggest that while AI-driven refugee allocation models can provide reliable recommendations for the majority, they may still fail to account for exceptional cases. Addressing these limitations would require richer datasets or complementary qualitative assessments to capture unmeasured factors that contribute to high-earning success.

On the other hand, Ferwerda et al. (2022) highlight that the potential success of data-based decision-support systems recommendations in Norway is largely influenced by the extensive historical data of the country on migrant integration, which allows the algorithm to generate more reliable predictions. Studies utilizing administrative data have demonstrated the potential of these algorithmic approaches in refugee placement, as they leverage comprehensive datasets, such as demographic and labour market information to develop predictive models for integration success (Ferwerda et al., 2022). This aligns with broader trends in computational policymaking, where access to rich administrative records enhances predictive accuracy.

In that sense, Carammia et al. (2022) emphasize that the effectiveness of such algorithmic tools depends not only on computational power but also on the quantity and quality of available data, underscoring the importance of robust data infrastructure for optimizing migration management. Without these conditions, such systems risk reinforcing biases, producing unfair outcomes, and placing additional strain on institutional decision-making, and as highlighted by Beduschi (2021) it is important to assess the quality of the data used for training algorithms at an early stage in the algorithmic cycle as failing to do so may lead to breaches of human rights of those affected by the technology.

Broadly speaking, the research on predictive analytics for migration management highlights the potential of data-based tools to enhance public sector decision-making and transform traditional refugee allocation frameworks. The studies have demonstrated that algorithmic placement could significantly improve refugee employment outcomes, offering a promising alternative to conventional assignment methods based on immediate resettlement capacity or random distribution (Angenendt et al., 2023; Bansak et al., 2018; Ferwerda et al., 2022). However, the successful implementation of such tools requires strong policy coordination, as migration management inherently involves multiple stakeholders across national, regional, and local levels (Beduschi, 2021; Carammia et al., 2022).

In the existing literature it is acknowledged that while data-based recommendations can optimize integration outcomes, their effectiveness depends on whether governments can align institutional priorities, administrative processes, and resource allocation to translate algorithmic insights into actionable policies. This coordination challenge is not unique to data-based solutions as public sector governance often struggles with cross-agency

collaboration, particularly in highly complex policy areas such as migration, where social services, labour markets, housing, and legal frameworks must operate synergistically.

In this context, Bansak et al. (2018) provided one of the earliest empirical applications of AI-based and data-based refugee allocation, paving the way for the integration of advanced technologies into policymaking processes. These findings laid the foundation for further research on the intersection of algorithmic decision-making and interagency cooperation in migration governance, highlighting the potential for these innovations to transform complex policy landscapes.

2.2. Ethical Challenges of AI Models for Migration Management

While recent developments in frontier technologies have brought many opportunities, particularly in the field of migration management (Bircan & Korkmaz, 2021), they also raise significant concerns and challenges for societies in terms of ethics and technical limitations (Bircan & Korkmaz, 2021). The growing reliance on AI for controlling migration flows and managing border spaces has drawn criticism from scholars and civil society, who warn against the risks of treating AI as a panacea for the highly context-dependent and uncertain governance challenges posed by migration (Langrand, 2024). Automated decision systems utilized in diverse applications across both governmental and private sectors, can significantly impact human rights within immigration and refugee systems (Bither & Ziebarth, 2021).

These systems, whether functioning autonomously or as a component of human decision-making, influence both the procedural and substantive outcomes of decisions traditionally rendered by administrative bodies and officials, such as judges, civil servants, and border agents, therefore, careful consideration of their ethical and legal implications is needed (Molnar & Gill, 2018). As Blouchoutzi et al. (2022) argue, migration is not a problem to be solved but a phenomenon that must be managed. This perspective reframes the role of AI models in migrant integration, positioning them as tools for migration management rather than definitive solutions to broader challenges such as funding constraints (Carammia et al., 2022) or institutional coordination (Bansak et al., 2018).

Building on this understanding, reconceptualizing migration as a dynamic process that requires management rather than resolution allows for a more realistic and responsible integration of AI in this domain. Migration does not lend itself to definitive solutions but requires continuous governance responses informed by evolving social, political, and humanitarian contexts (Blouchoutzi et al., 2022). In this view, AI technologies can be integrated as supportive tools within migration management systems, enhancing the capacity for coordination, strategic planning, and data analysis (Guillén & Teodoro, 2023). This management paradigm allows for the incorporation of AI without assuming it will displace human decision-makers; instead, AI becomes a mechanism to support people-centered and context-sensitive responses to migration challenges (Guillén & Teodoro, 2023).

In contrast, framing migration as a solvable problem fosters an overreliance on automated systems and data analytics as substitutes for human judgment (Bither & Ziebarth, 2021). This perspective not only oversimplifies the governance of migration but also obscures the risks of algorithmic bias, opacity, and the reproduction of structural inequalities, risks that AI systems are known to carry when deployed uncritically (Beduschi, 2021; Vohra, 2023).

As Maj et al. (2024) note, algorithmic management encompasses both fully autonomous decision-making and human decisions assisted by algorithmic systems, highlighting the importance of maintaining human oversight. Moreover, as AI algorithms are fuelled by data, their expanded use in migration governance will not only demand increasing volumes of data but also contribute to the growing datafication of migration management (Beduschi, 2021) a trend characterized by heavy reliance on diverse data sources, including big data and satellite imagery, for border control and policy design (Broeders & Dijstelbloem, 2015; Beduschi, 2021).

While these tools hold promise, Beduschi (2021) emphasizes that data quality, system sophistication, and computational power are not sufficient on their own; decision-making must also account for qualitative, ethical, and human-centered considerations (Ruschemeier & Hondrich, 2024), especially when outcomes affect vulnerable populations such as refugees and asylum seekers. Therefore, moving beyond abstract ethical declarations, it is imperative to operationalize AI ethical principles into concrete

practices that mitigate risks and safeguard rights in real-world humanitarian settings (Guillén & Teodoro, 2023).

In that sense, it has been identified how as technological capacity of data-based systems expands, so too does the challenge of ensuring their outputs remain intelligible and useful for decision-makers in public administration and migration management (Molnar & Gill, 2018). First, one of the central challenges is the increasing opacity of data-based systems as their complexity grows. The more data these systems process, the more abstracted and less interpretable their models become, and this represents a challenge not only for policymakers but also for the data teams responsible for the management of these tools. This phenomenon, often referred to as the "black box" effect, has been widely noted in the literature, and it is described as the process where the humans cannot understand which factors were considered by machine learning systems during the process of producing outcomes (Angenendt et al., 2023).

As Molnar and Gill (2018) explain, the internal logic of advanced automated decision systems can become unintelligible even to their developers, particularly as the systems evolve through iterative learning processes. Angenendt et al. (2023) similarly highlight that the reliance on massive datasets to produce insights may, paradoxically, lead to a situation in which the outcomes of predictive analytics are less transparent and less actionable for those tasked with policy implementation. This concern is further exacerbated by the risk that statistical correlations derived from large datasets may be misinterpreted as causal relationships or policy-relevant insights when, in fact, they may lack contextual validity (Ajunwa, 2020).

Moreover, beyond the technical complexity of these systems lies the sociotechnical challenge of bridging the gap between the developers of these tools and their end-users (Casagran et al., 2021), and this is particularly noticeable for civil servants, social workers, and civil society actors working directly with migrant populations. In fact, Bircan et al. (2023) observe that a persistent lack of dialogue between data scientists and public authorities hinders the effective application of AI tools in specific migration governance cases. Furthermore, Casagran et al. (2021) emphasize the importance of a dual structure in the use of predictive tools: one unit dedicated to interpreting and contextualizing results, while another is focused on engaging with policymakers to ensure the tool’s outputs are properly integrated into governance processes. This underscores a

critical point: the deployment of predictive analytics for policymaking is not simply a technical matter, but a collaborative and interpretative task that requires ongoing interaction between interdisciplinary teams (Bircan et al., 2023; Casagran et al., 2021). These insights highlight the need for sustained assistance for policy practitioners, both in developing an understanding of how these tools operate and in cultivating the capacity to assess when and how they should be deployed effectively (Casagran et al., 2021).

Notably, an overreliance on data and algorithmic outputs may lead to misguided policy decisions if not critically mediated by human expertise and experience (Beduschi, 2021). Ajunwa (2020) critiques the epistemological shift encouraged by big data proponents who assert that correlation is enough and suggest that algorithms alone can reveal truths that elude traditional scientific methods. Such an approach risks marginalizing the interpretative and contextual knowledge that social scientists bring to the table, experiences that are essential when working in complex, value-laden fields such as migration. While machines may identify patterns, only human researchers and practitioners can assess their relevance, ethical acceptability, and social implications (Ajunwa, 2020). This reflection reinforces the idea that data, while powerful, cannot substitute for the nuanced understanding that comes from lived experience and rigorous qualitative inquiry (Ruschemeier & Hondrich, 2024).

Expanding on the fairness, legal experts highlight this issue by advocating for "algorithmic affirmative action" (Ajunwa, 2020) emphasizing that algorithms, despite being perceived as fair due to their computational nature, can still reflect and replicate real-world discrimination (Ajunwa, 2020; Vohra, 2023). Researchers argue that algorithms trained or operated on a real-world data set that necessarily reflects existing discrimination may well replicate that discrimination. This underscores a fundamental concern: because historical data are inherently biased toward certain groups or classes, even automated algorithms designed in a neutral manner may yield discriminatory outcomes (Ajunwa, 2020).

Discrimination in AI-driven models manifests in two primary forms: direct and indirect discrimination. Direct discrimination occurs when unlawful factors, such as race or gender, are explicitly or implicitly incorporated into decision-making processes. For example, an AI model trained on biased historical hiring data may learn and perpetuate existing racial or gender disparities in hiring practices (Molnar & Gill, 2018). On the other

hand, indirect discrimination, also known as proxy discrimination, arises when seemingly neutral variables disproportionately disadvantage protected groups. This occurs when certain factors—though not explicitly discriminatory—act as proxies for sensitive characteristics such as race, ethnicity, or gender.

For instance, an algorithm using geographic location as a criterion may unintentionally disadvantage racial or ethnic groups concentrated in specific areas. Similarly, pension calculations based on continuous years of employment could penalize women who take career breaks for caregiving responsibilities (Molnar & Gill, 2018). Proxy discrimination is particularly insidious because it is often difficult to detect or prevent, as decision-makers may not be consciously aware of the biases embedded within the data or the AI models they employ.

Hence, discriminatory outcomes can emerge even when decision-makers are not explicitly motivated to discriminate. While analysing the paradox of automation as anti-bias intervention, Ajunwa (2020) highlight a critical mechanism through which algorithmic systems can produce discriminatory outcomes, when key traits like worker productivity or likelihood of labour market participation are unobservable, decision-makers may rely on correlated, easily observable attributes such as race or gender as proxies. In doing so, AI systems risk encoding and operationalising these proxies in ways that mirror and perpetuate structural inequalities, even in the absence of explicit intent to discriminate.

Consequently, even in the absence of intentional bias, AI systems can reinforce and entrench real-world inequalities, making discrimination more pervasive and difficult to address. Unlike human decision-makers, who may express their biases openly or whose prejudices can be confronted and interrogated, algorithmic systems often embed such biases beneath a facade of objectivity and mathematical precision (Vohra, 2023). A substantial body of the literature surveyed adopts a critical stance towards the potential that algorithms have for carrying biases under the veneer of mathematical neutrality, making them less visible and harder to challenge (Ajunwa, 2020; Beduschi, 2021; Bither & Ziebarth, 2021; Vohra, 2023). This perceived neutrality can lend unfair legitimacy to biased outcomes, as the technology may be trusted more than human discretion despite being just as susceptible to historical and systemic discrimination.

In sum, the reliance on data-based, AI-driven decision-making carries a profound risk of replicating historical biases, leading to both direct and indirect discrimination. These risks underscore the necessity of critically evaluating and mitigating bias in algorithmic models, ensuring that technological advancements do not exacerbate existing societal inequities but instead promote fairness and inclusivity. The key challenge lies in ensuring that these tools are designed and deployed with appropriate safeguards to prevent unintended harms while maximizing their benefits (Guillen & Teodoro, 2023). The literature widely highlights the risks associated with the deployment of AI tools for humanitarian purposes. Scholars warn about the emergence of *surveillance humanitarianism* (Beduschi, 2021), where extensive data collection by humanitarian actors occurs without sufficient safeguards, raising concerns about privacy and misuse.

2.3. Empirical Perspectives on Bias in Algorithmic Migration Management

A key challenge in the context of migration management is the overreliance of caseworkers on potentially opaque algorithms (Beduschi, 2021). The opacity of these algorithms, as previously discussed, stems from the nature of machine learning, where the internal processes of models can obscure the factors driving their recommendations producing what is known as the 'black box' effect (Angenendt, 2023). In that sense, a significant concern, as highlighted by Beduschi (2021), lies in the susceptibility of human decision-makers to favour machine-generated outputs, even when those outputs are flawed, this tendency is defined as automation bias (Wickens et al. 2015).

Building on this definition, automation bias is a well-established issue in the study of human-technology interaction. Specifically, it describes the tendency for individuals to depend excessively on automated systems, even in the presence of contradictory information from other sources (Alon-Barkat & Busuioc, 2022). Consequently, rather than engaging in vigilant information seeking and processing, individuals may uncritically defer to automated advice (Alon-Barkat & Busuioc, 2022). Several factors contribute to automation bias. For example, research suggests that it can arise from cognitive limitations, such as a reluctance to engage in demanding mental effort, or from an unwarranted trust in the perceived accuracy of algorithmic systems (Alon-Barkat & Busuioc, 2022; Ruschemeier & Hondrich, 2024; Vohra, 2023).

The implications of automation bias have been studied by social psychology across various domains, including medicine, aviation, traffic safety, and national security (Ruschemeier & Hondrich, 2024). However, while the use of algorithms and AI in public administration is increasing, empirical research on automation bias within this sector, and specifically in migration management, remains limited. Alon-Barkat & Busuioc (2022) provide a notable exception, and their work also identifies a related but distinct phenomenon: selective adherence. Selective adherence refers to the tendency to disproportionately favour algorithmic advice that aligns with pre-existing stereotypes about particular groups. Given that migration governance often involves vulnerable populations from marginalized and stereotyped groups, the risk of selective adherence, a form of confirmation bias, poses a significant threat to equitable decision-making.

Academic literature often posits a tendency for humans to over rely on algorithmic suggestions; however, empirical evidence highlights the need to scrutinize this assumption contextually. For instance, a study conducted in the Netherlands by Alon-Barkat & Busuioc (2022) explored this very dynamic by asking participants to make a personnel decision based on conflicting numeric (algorithmic or human-expert generated) and qualitative inputs. Their findings indicated minimal difference in the adherence of participants to the numeric score regardless of its source, challenging the expectation of strong automation bias in this scenario. On the other hand, the apprehension regarding selective adherence posits that decision-makers may disproportionately favour algorithmic outputs that align with pre-existing biases or stereotypes concerning the subjects of those decisions.

Empirical investigations, such as the second study by Alon-Barkat & Busuioc (2022), further illuminate this dynamic by demonstrating that "selective adherence" to decisional aids occurs not solely in response to algorithmic advice, but also when the guidance is provided by human experts. Notably, their experiment identified a 50% greater likelihood of participants following the advice to not renew the contract of a teacher from a negatively stereotyped minority group (Moroccan-Dutch) compared to a teacher from the majority group (Dutch) when both received the same low performance score (Alon-Barkat & Busuioc, 2022). This significant finding underscores that the inclination to lend more weight to information confirming existing stereotypes transcends the algorithmic source, indicating a more fundamental cognitive or social bias at play. Consequently, while the incorporation of AI may automate and potentially amplify the application of

such biases, the phenomenon of "selective adherence" itself is not unique to algorithmic decision support, highlighting the persistent challenge of mitigating human biases even in the presence of seemingly objective tools.

The findings of this specific study on automation bias in public administration highlight a potential misalignment between theoretical expectations of algorithmic deference and actual decision-making behaviour. While automation bias remains a concern, empirical studies, such as Alon-Barkat & Busuioc (2022), suggest that decision-makers do not always uncritically follow algorithmic advice. Instead, factors such as the availability of conflicting qualitative information can lead decision-makers to exercise their judgment. However, the risks associated with both automation bias and selective adherence in public administration, and particularly in migration management, should not be underestimated. As noted by public administration scholars, the increasing reliance on algorithmic tools has the potential to displace bureaucratic discretion and professional judgment (Alon-Barkat & Busuioc, 2022).

This displacement of human expertise, a concept also emphasized by Pakarinen & Huising (2023), raises concerns about the erosion of accountability and the loss of crucial contextual understanding in decision-making. Furthermore, as the literature on automation has theorized, algorithmic decision aids may create a "moral buffer", diminishing the sense of moral agency and responsibility in human decision-makers (Alon-Barkat & Busuioc, 2022). This psychological distancing can have serious consequences, particularly in high-stakes contexts like migration management, where decisions can profoundly impact the lives of individuals and entire families. The perception that the algorithm is *in charge* can lead to a detachment from the human consequences of those decisions (Cummings, 2006).

To illustrate this complex interplay of human-technology interaction and its effects on decision-making, the “Dutch Childcare Benefit Scandal” occurred between 2005 and 2019 and revealed to the public in 2021, serves as a clear real-life case study. In this instance, an algorithmic system designed to detect fraud incorrectly flagged numerous families, disproportionately those with a non-Dutch background, leading to severe financial and social hardship (Amnesty International, 2021). The overreliance of decision-makers on the algorithm, even in the absence of sufficient qualitative data or contextual understanding due to the “black box” effect (Amnesty International, 2021),

exemplifies both automation bias and selective adherence, as the algorithm amplified pre-existing biases against certain groups.

This ultimately resulted in a profound detachment from the human consequences of the decisions. As highlighted by Alon-Barkat & Busuioc (2022) and demonstrated by the Dutch scandal, the absence of qualitative data to counterbalance algorithmic outputs can have devastating effects, underscoring the critical need for contextual information and human expertise to inform and guide algorithmic decision-making processes (Ruschemeier & Hondrich, 2024).

Additionally, the complexity of translating legal frameworks and professional practices into algorithms, as highlighted by Geirbo & Røste (2023), introduces additional layers of risk. The process of converting laws, which are often open to interpretation, into the rigid logic of algorithms can lead to a loss of nuance and contextual understanding. System developers, who may lack expertise in law or the specific complexities of migration casework, are often the ones making these crucial translations. This can result in systems that are not only prone to automation bias but also fail to adequately reflect the legal and procedural requirements of migration management.

2.4. Testing Grounds and Technological Solutionism in Migration Policy

One particularly contentious critique, emphasized by Bircan and Korkmaz (2021), is that refugee and migrant populations are increasingly being used as experimental subjects for testing unproven AI-based solutions. According to the legal studies literature (Beduschi, 2021; Molnar & Gill, 2018) migrant communities often lack the capacity to object decisions on their status, whether due to limited legal protections, restricted mobility, or insufficient knowledge of how their data is being used. Despite these vulnerabilities, governments and private actors continue to collect vast amounts of data from refugee camps and conflict-affected areas under the premise of technological innovation (Molnar & Gill, 2018). The justification lies in the need for large, diverse datasets to improve algorithmic performance, however, the implications of using marginalized populations as testing grounds remain ethically strained.

This practice unfolds in parallel with the growing integration of data-based technologies into the humanitarian sector. While such innovations are often framed as tools to enhance service delivery, they also present significant risks. These include the potential to reinforce existing inequalities and unfairness, undermine trust in algorithmic outputs due to the use of proprietary systems, and reduce transparency and explainability, particularly when algorithms are treated as commercial assets shielded from public audit (Guillén & Teodoro, 2023; Molnar & Gill, 2018). Indeed, a major obstacle to accountability lies in the opacity of these systems. Many are developed by private vendors rather than government agencies, and their source code, training data, and design parameters are frequently classified or protected as intellectual property, especially in contexts where migration intersects with national security interests (Molnar & Gill, 2018).

This opacity also contributes to the technological solutionism in migration governance, where AI tools are prematurely viewed as quick fixes to deeply complex governance challenges. Molnar and Gill (2018) caution that such reliance on automated decision-making can obscure the normative and legal dimensions of migration management, particularly when decisions about migrant allocation or legal status are made by opaque, unaccountable systems. Canada, for example, has incorporated machine learning and predictive analytics into immigration procedures, prompting debates about due process and systemic bias (Molnar and Gill, 2018). Other countries have followed similar trajectories, often without sufficient safeguards or critical oversight.

As a result, migration governance risks becoming a proving ground for emerging technologies, even before their full ethical, legal, and societal implications are adequately understood. Scholars argue that this dynamic creates a dual imperative: not only must the deployment of AI in migration be accompanied by rigorous, rights-based research and transparent evaluation, but it also demands stronger legal frameworks for data protection—particularly for populations with limited agency in how their data is collected and used (Bircan & Korkmaz, 2021; Molnar & Gill, 2018). The perceived scalability and utility of these systems have attracted the interest of private companies, further entrenching a model of experimentation that may ultimately prioritize innovation over accountability.

3. PROBLEM SETTING

ICT developments have become one of the key driving forces behind the transformation of public governance (Bovens & Zouridis, 2002). Traditional civil service roles have changed, with websites and advanced information systems assuming functions previously held by office clerks, case managers, and adjudicating officers, which has altered the nature of work for those in public administration (Bovens & Zouridis, 2002; Buffat, 2013). To understand the role of ICT and AI in the contemporary public sector, it is necessary to employ theoretical frameworks that not only explain the evolution of public service delivery, but also critically assess the broader social and moral dynamics that influence technological adoption. These dynamics cannot be reduced to purely technical variables (Kudina & Van De Poel, 2024).

With the aim of analysing the role of AI and data-based tools in migration management, particularly in the context of refugee and asylum seeker labour integration, this research draws on two complementary theoretical perspectives: the sociotechnical perspective on AI, proposed by Kudina and Van De Poel (2024), and the framework of evolving bureaucratic levels (from street-level to system-level), as developed by Bovens and Zouridis (2002) and further elaborated by Buffat (2013) in the context of e-governance.

The sociotechnical perspective, as the main theoretical framework for this research, provides a lens for understanding how AI not only performs functions within the public sector but also reshapes moral and normative expectations. On the other hand, the model of Bovens and Zouridis (2002) and Buffat (2013), as a complementary theory, will facilitate the institutional understanding of how digital tools transform decision-making processes within public administrations. Together, these frameworks offer a comprehensive basis for evaluating both the administrative and ethical dimensions of AI-driven transformations in migration governance.

3.1. The Sociotechnical Perspective on AI

A sociotechnical system perspective refers to the correlative configuration of technical components and social elements—such as people, norms, and organizational structures—that interact to achieve a shared objective within a specific context through the means of

technology (Kudina & Van De Poel, 2024). At its heart, the sociotechnical system perspective rests on two key notions. Firstly, it posits that technologies are not isolated entities but rather integral components of broader systems, which can be purely technical or encompass both technical and social elements. These systems can be analyzed at various levels of complexity. Secondly, this perspective emphasizes the critical role of human and social factors in the effective operation and functioning of these sociotechnical systems (Kudina & Van De Poel, 2024). In this regard, adopting a sociotechnical systems perspective can introduce three elements that are often absent or less emphasized in alternative frameworks: institutions, culture, and governance (Kudina & Van De Poel, 2024).

Adopting the sociotechnical perspective for analysing the integration of AI tools for refugee and asylum seeker integration in host societies is crucial for understanding how technological developments themselves carry, among other factors, social, ethical, and political implications. In this regard, the work of Kudina and Van De Poel (2024) offers a valuable lens. They argue that AI should not be understood merely through technical factors but must also be situated within the broader social contexts that influence its development and deployment. Furthermore, Kudina and Van De Poel (2024) emphasize that AI technologies are not only shaped by these contexts but actively participate in reshaping them, mediating human values, behaviours, and societal norms.

According to the European Commission (2023), AI constitutes a sociotechnical system, meaning it is built not only from technical components but also from diverse social, political, economic, and cultural elements. From an academic standpoint, the concept of sociotechnical systems has been explored across a wide array of disciplines, including science and technology studies (STS), philosophy of technology, and, more recently, investigations into AI and autonomous systems (Kudina & Van De Poel, 2024). This wide disciplinary engagement underscores the importance of considering both technical and social dimensions when analyzing the design, implementation, and impact of new technologies. Adopting a sociotechnical systems perspective is essential for better understanding how AI systems operate, what social, political, and ethical issues they raise, and how these challenges can be effectively addressed (Kudina & Van De Poel, 2024). Recognizing the entanglement between technological and societal factors enables a more comprehensive evaluation of AI's role within governance structures.

Kudina and Van De Poel (2024) highlight three fundamental constituents of sociotechnical systems: technologies, human agents, and institutions. It's crucial to note that institutions, in this context, are not defined as organizations but rather as the social rules that both enable and constrain the interactions among human agents, as also emphasized by Crawford and Ostrom (1995). These institutions can manifest as formal structures, such as legal regulations, or as informal norms rooted in custom or culture. While typically evolving from past human interactions, institutions can also be intentionally designed. The development of novel sociotechnical systems may necessitate the creation of new institutional frameworks, exemplified by user manuals, operational guidelines, or insurance policies (Kudina & Van De Poel, 2024).

Kudina & Van De Poel (2024) state that institutions shape human and AI interaction, while culture, viewed as informal institutions, actively influences AI appropriation and effectiveness by embedding and potentially reshaping beliefs and expectations within training data and deployment. Critically, effectively addressing the ethical and societal challenges of AI necessitates a focus on governance, extending beyond ethical guidelines and design to encompass coordinated technical, social, economic, and political choices, highlighting the inherently political nature of navigating AI's disruptive potential.

3.2. The Evolution of Bureaucracy in the Digital Age

Policy comes alive in the daily practice of street-level bureaucracy (Bovens & Zouridis, 2002). Citizens must interact with the public sector to access services, benefits, or even be sanctioned. According to Bovens and Zouridis (2002), these interactions typically occur through direct engagements with caseworkers which are referred to as street-level bureaucrats. Bovens and Zouridis (2002) define street level bureaucrats as civil servants positioned at the intersection between individual citizens and large-scale administrative systems; these civil servants play a pivotal role in translating policy into practice. In this regard, given their influence over final decisions, Bovens and Zouridis (2002) argue that street-level bureaucrats function as *de facto* policymakers.

To mitigate the risks associated with discretionary decision-making in street-level bureaucracies, many European legal systems such as those in the Netherlands, Germany, and France have embedded the principle of legality into their administrative frameworks

(Bovens & Zouridis, 2002). This principle mandates that the actions of executive bodies must be firmly grounded in codified law. As a result, legislators actively seek to define standards that both guide and constrain administrative discretion, aiming to ensure that decisions are predictable, legitimate, and consistent with legal norms (Bovens & Zouridis, 2002).

In this sense, the gradual introduction of ICT into public administration became a key tool to implement the principle of legality, facilitating the formalization and standardization of administrative procedures, albeit with variations across different policy areas (Bovens & Zouridis, 2002; Buffat, 2013). In this process, discretion was increasingly formalized, standardized, and delegated to technological systems, though the extent of delegation to machines varies depending on the specific context. In smoke cases, authority shifted from individual caseworkers to centralized systems, controlled by algorithms and system design (Bovens & Zouridis, 2002).

On the other hand, a system-level bureaucracy is characterized by a significant shift away from direct, face-to-face interactions between public officials, archive management and citizens. In this model, ICT plays a central role not merely in data registration but in executing and controlling the entire production process, often managing routine cases without human intervention through expert systems (Bovens & Zouridis, 2002). However, as Bovens and Zouridis (2022) also note, effectiveness and fairness ultimately depend not only on the algorithms themselves but also on the extent to which the rule of law is adequately embedded within the design and operation of these systems.

According to Bovens and Zouridis (2002), the evolution from street-level to screen-level and system-level bureaucracies—and the increasing prevalence of ICT in the public sector—is largely driven by the pursuit of detailed, legally oriented administrative systems where executive discretion is minimized. This shift aims to enhance public sector efficiency by ensuring uniformity, predictability, and compliance with the rule of law. However, the authors also warn of the risks associated with system-level bureaucracies: the elimination of discretion leaves little room for flexibility or exceptional treatment, which may, paradoxically, result in new forms of arbitrariness and injustice (Bovens & Zouridis, 2002).

Table 1. Synthesis of the Evolution of Bureaucracy in the Digital Age (Bovens & Zouridis, 2002; Buffat, 2013)

	Street-level bureaucracy	**Screen-level bureaucracy**	**System-level bureaucracy**	**Buffat (2013)**
Role of ICT	Supportive	Leading	Decisive	Emphasizes ICT as both a constraining and enabling force
Functions of ICT	Data registration	Case assessment and virtual assembly line	Execution, control, and external communication	Highlights the complex ways ICT is used by both frontline workers and citizens
Human interference with individual cases	Full	Partial	None	Argues that human discretion is not eliminated but transformed
Legal regime	Open, ample discretion, single legal framework	Detailed, little discretion, single legal framework	Detailed, no executive discretion, exchange between legal domains	Points out the importance of the context in shaping the impact of ICT on discretion

In the context of migration management, this evolution implies that algorithmic suggestions provided by data-based tools are increasingly influencing, and in some cases potentially determining, the decisions made by caseworkers. This reflects a shift towards a screen-level bureaucracy, where ICT and AI play a significant role in shaping administrative processes.

Although Bovens and Zouridis (2002) presented their theory more than two decades ago, it remains highly relevant today, particularly given the advent of AI tools. These tools introduce new dimensions of discretion which are exercised not by humans, but by algorithms within what is still largely a screen-level bureaucracy. This has significant consequences for how decisions are made, and power is distributed in administrative processes. Moreover, Bovens and Zouridis (2002) emphasize that introducing changes to legal frameworks becomes increasingly complex as bureaucracies evolve from the relatively manageable adjustments in street-level bureaucracies to the significantly more challenging modifications required in screen-level and, ultimately, system-level bureaucracies.

Taking this forward, detailed and rigid normative frameworks are necessary to govern automated decision-making and to ensure compliance with constitutional principles such as the rule of law. This emphasis on legal embedding resonates with the findings of Ferwerda et al. (2022), who observed that the performance of the AI tool GeoMatch in the Norwegian context varied significantly depending on whether existing legal constraints were applied. Such findings raise critical questions about the extent to which AI tools operationalize legal norms in practice, and whether their deployment reproduces, restricts, or redefines the discretionary space traditionally occupied by human caseworkers within legally embedded administrative systems.

3.3. Integrating the Sociotechnical Perspective and the Evolution of Bureaucracy

The evolution from street-level to more complex-level bureaucracies, as analysed by Bovens and Zouridis (2002), is not solely a shift in administrative technique; rather, it represents a deeper reconfiguration of the relationship between citizens, the state, and technology. By embedding legal and operational rules into technological systems, decision-making becomes more standardized and less exclusively reliant on human discretion. However, this transformation does not merely affect the efficiency of service delivery; it also subtly reorients the priorities and values embedded within public governance.

From a theoretical and practical sociotechnical perspective, it becomes evident that the adoption of ICT and AI tools carries not only technical consequences but also broader

political, moral, and cultural implications. The level of bureaucracy is shaped by a complex interplay of technological advancements and social, political, and institutional factors, not solely by the technology itself (Buffat, 2013; Kudina & Van De Poel, 2024). For instance, the application of advanced AI in migration management primarily at the screen level, rather than a fully automated system level, reflects the influence of these broader factors on the organization of administrative processes. In the case of migration management, the integration of data-based decision-making could inadvertently shift the emphasis from holistic protection of refugees and asylum seekers to narrower metrics and variables. Thus, the introduction of AI into migration governance must be understood as a force capable of reshaping societal values, not merely optimizing administrative functions.

Kudina and Van De Poel (2024) consider that technological developments such as AI are not neutral technical enhancements but rather catalysts for reconfiguring societal values and moral priorities. AI may be a disruptive technology when it comes to other sociotechnical systems and society (Kudina & Van De Poel, 2024), reshaping the way decisions are framed and evaluated. In migration management, this disruption might entail a shift in priorities: under the influence of algorithmic decision-support systems, labour market integration could be privileged over other critical aspects of refugee and asylum seeker protection, such as mental health support, access to housing, or safeguarding fundamental rights. This perspective reinforces the idea that ICT does not merely optimize existing governance structures but actively participates in redefining their normative goals (Kudina & Van De Poel, 2024). The introduction of AI thus demands careful ethical reflection, not only on the outcomes it generates but also on the broader societal transformations it drives, often subtly and unintentionally.

Another critical insight emerging from the sociotechnical systems perspective is the contextual dependency of technological performance and ethical alignment. While some frameworks, such as those proposed by Beduschi (2022), advocate for the establishment of global standards for AI in migration management, Buffat (2013) and Kudina and Van De Poel (2024) warn against the assumption that universal design principles or fairness metrics can guarantee successful or ethical AI deployment across different governance systems. Instead, the authors emphasize that designers must move beyond universal design principles and fairness metrics, instead grounding these considerations within the

specific context and the encompassing sociotechnical systems where the AI technology will operate (Kudina & Van De Poel, 2024).

This contextual sensitivity is particularly important in migration management, where national legal frameworks, cultural expectations, and political pressures vary significantly. The example of GeoMatch further illustrates this point: as shown by Ferwerda et al. (2022), the model's performance varied when tested under different legal and operational constraints, underscoring how sociotechnical environments fundamentally shape AI outcomes. Similarly, Bovens and Zouridis (2002) stressed that the shift toward more ICT dependent and complex-level bureaucracies required detailed normative frameworks to embed technological processes under the rule of law. Creating new sociotechnical systems may also require creating new institutions (Kudina & Van De Poel, 2024). Thus, implementing AI in migration governance is not merely a technical upgrade but demands the negotiation and continual adaptation of legal, institutional, and social structures to avoid ethical pitfalls and ensure legitimacy.

In essence, Kudina and Van De Poel (2024) contend that a sociotechnical lens provides a more comprehensive understanding of AI's moral significance by moving beyond a purely technological focus. This perspective aligns with a growing philosophical view that morality is not solely a human domain but rather emerges from the complex interplay between humans and their sociocultural and material surroundings. Consequently, analysing the ethical dimensions of AI necessitates considering its integration within broader sociotechnical systems, encompassing institutions, culture, and governance, rather than viewing it in isolation.

3.4. Literature Gap and Research Question

While an expanding body of academic research has examined the technical capacities and ethical risks of AI-based tools in migration governance (Beduschi, 2021; Bither & Ziebarth, 2021), and some authors have empirically explored risks such as automation bias and selective adherence in the public sector (Alon-Barkat & Busuioc, 2022), limited empirical research exists on how these tools are perceived by the actors responsible for their design and implementation themselves, particularly, public officials working within national migration systems and AI developers. Existing studies often emphasize normative frameworks or technical modelling outcomes, however they tend to overlook

explicitly exploring the institutional, legal, and operational dynamics that shape the deployment and acceptance of such tools. Moreover, the few available empirical assessments primarily focus on predictive accuracy or resettlement outcomes, offering little insight into how practitioners negotiate the tensions between human discretion, legal mandates, and algorithmic recommendations in everyday practice.

This study seeks to address that gap by investigating how public officials and AI developers understand the broader sociotechnical factors influencing the design and implementation of AI-based tools, as well as how they perceive the impact of these tools on bureaucratic structures and decision-making processes. These questions are explored through qualitative interviews with developers of tools such as GeoMatch and Annie™, and with senior advisers and migration officials in Canada and Norway. The empirical findings are critically analysed through the theoretical frameworks proposed by Kudina and Van De Poel (2024), Bovens and Zouridis (2002), and Buffat (2013), as detailed in the methodology section.

This comparative and exploratory qualitative study is guided by the following research question:

Main Research Question:

What institutional, technical, and contextual conditions enable the deployment of AI-based tools for migration management?

Subquestions:

1. How do public officials and AI developers understand the sociotechnical factors influencing the design and implementation of AI-based tools in the public sector?

2. How do public officials and AI developers perceive the impact of AI on bureaucratic structures and public sector decision-making?

4. CASE BACKGROUND: AI-BASED MODELS FOR MIGRATION MANAGEMENT

Automation in decision-making for migration governance is an expanding trend (Bither & Ziebarth, 2021). Across academic research, the private sector, NGOs, and governmental institutions, there is growing interest in the potential of AI-based solutions to link labour market needs with the arrival of skilled migrants, asylum seekers, and refugees. Despite this interest, real-life examples of AI-based systems for matching and integration remain limited. During the literature review phase of this dissertation, it was identified that several countries are making efforts to test new data-driven models for migration governance (Angenendt et al., 2023).

One such initiative is the *Match'In* project, which aims to support the placement of asylum seekers and refugees through an algorithm-based matching system developed in partnership between the Migration Policy Research Group (MPRG) at the University of Hildesheim and the Migration, Displacement and Integration (MFI) unit at the Friedrich-Alexander-Universität Erlangen-Nürnberg (FAU) in Germany (Match'In Projekt, 2022). The project seeks to integrate migrant populations into the labour market and has been piloted in the federal states of Hessen, Lower Saxony, North Rhine-Westphalia, and Rhineland-Palatinate (Match'In Projekt, 2022), with preliminary results presented in March 2025. However, despite its novelty, *Match'In* was not selected for this research, as it appears to remain largely in a theoretical or pilot phase, and key materials and results are only available in German, creating accessibility limitations.

In contrast, the two most advanced and widely referenced tools are GeoMatch and Annie™. According to Bither and Ziebarth (2021) and OECD (OPSI, 2020), Annie™ was the first AI-based solution implemented for refugee and asylum seeker integration. Developed by HIAS and deployed in the United States since 2018, Annie™ has been operational long enough to allow for an assessment of its outcomes and feasibility. GeoMatch, first introduced by Bansak et al. (2018), is currently being piloted in the Netherlands and Switzerland.

While both tools aim to match refugee populations to optimal host communities, they differ significantly in their operational design. Annie™ relies on historical case data collected and managed internally by HIAS, one of the agencies responsible for refugee

resettlement in the U.S. (Samber, 2018). In contrast, GeoMatch depends on institutional data shared by partner countries and processed collaboratively to generate predictive analytics (Information extracted from conversation with IPL-GeoMatch developer). These two tools were selected as case illustrations not only because of their maturity and influence in the field but also because their respective development teams offer valuable insight into the technical, ethical, and institutional considerations of applying AI to migration management.

In terms of geographic focus, countries such as the United States, Canada, Australia, and the Nordic nations have played a central role in refugee resettlement, particularly through UNHCR-coordinated programs during the early 2010s (Andersson et al., 2018). More recently, countries such as Germany, Iran, and Turkey have seen a significant increase in refugee arrivals (McAuliffe & Oucho, 2024). However, Canada and Norway were specifically selected as case studies in this dissertation due to their longstanding institutional experience in managing migration, their strong integration infrastructures, and their relevance as potential adopters of AI-based solutions.

On the Canadian side, active discussions are underway with the Immigration Policy Lab to develop and adapt a version of GeoMatch for national use (Information extracted from conversations with IPL-GeoMatch official and Canadian officer from Permanent Economic Immigration unit). On the Norwegian side, researchers have conducted prospective scenario modelling to explore the potential of algorithmic tools for refugee integration (Ferwerda et al., 2022). While neither country has implemented these systems at scale, both are engaged in strategic dialogue on the future role of AI in migration governance.

This selection is further justified by the shifting global policy landscape on migration (Robinson, 2018), where developers with strong ties to U.S.-based projects, such as those behind GeoMatch (Stanford University) and Annie™ (Worcester Polytechnic Institute), are increasingly seeking new institutional contexts for application. Canada and Norway, although not yet implementing such systems broadly, remain closely linked to ongoing debates and offer a critical perspective on institutional readiness, ethical concerns, and potential implementation pathways. Therefore, their inclusion in this study provides not only geographical and political diversity but also valuable insight into how migration governance actors are preparing for the integration of AI into public decision-making.

4.1. Case Selection: Introducing GeoMatch and Annie™ MOORE

Refugees and asylum seekers are typically placed by administrative or reception personnel in specific geographic areas, with decisions often based on the availability of resources in the host community or predetermined allocation guidelines, such as those applied at the state level (Bither & Ziebarth, 2021). Conducting case-by-case analysis to determine optimal placements requires significant human capital and public expenditure (Bither & Ziebarth, 2021). This process, along with the provision of subsidies and financial support, imposes considerable pressure on the resources of hosting countries. As a result, there is a growing interest among these countries to ensure the successful job integration of refugees and asylum seekers (Angenendt et al., 2023).

This study focuses on GeoMatch, an AI-based decision-support system designed by the IPL to optimize refugee settlement outcomes (Hotard, 2024). The first reference to GeoMatch appears with Bansak et al. (2018) with the article "Improving refugee integration through data-driven algorithmic assignment". With this study, the authors and members of the IPL proposed a model which identifies the synergies between immigrants personal background and geographic characteristics of host countries, as according to the authors, existing refugee resettlement schemes often overlook these synergies (Bansak et al., 2018). Subsequently, pilot and trial projects of the tool have been undertaken in Switzerland and The Netherlands (Ferwerda et al., 2022). Nowadays, GeoMatch is offered by the IPL as a product for governmental immigration offices and other types of institutions within the refugee and asylum landscape.

The normative frameworks regarding refugee and asylum seeker integration are diverse, for example, in Switzerland and Norway, the responsibility for determining relocation falls under the jurisdiction of state agencies such as the Swiss State Secretariat for Migration and the Norwegian Directorate of Immigration (Bansak et al., 2018). On the other hand, in the United States, this process is decentralised and managed by private and non-profit resettlement agencies, such as the HIAS, which pioneered in the use of data-based algorithmic tools for migrant resettlement (Samber, 2018).

Besides GeoMatch, other algorithmic tools are under development. One example is the Annie™ MOORE system, which was deployed in the United States (Bither & Ziebarth, 2021). Similar to the case of GeoMatch, the Annie™ system was developed through a

collaboration involving HIAS, academic institutions (Worcester Polytechnic Institute, Lund University and University of Oxford), and the U.S. Department of State (OPSI, 2020; Samber, 2018). Annie™ has been designed exclusively for refugee resettlement which refers to the relocation of individuals whose protection requests are evaluated prior to their arrival at the host country's borders (Samber, 2018; Van Der Boor et al., 2020). According to HIAS (2018) and the OECD Observatory of Public Sector Innovation (2020), the use of Annie™ has led to an estimated 20% to 30% increase in employment outcomes among resettled refugees.

4.2. Operational Functioning of GeoMatch and Annie™ MOORE

The following overview of the GeoMatch system and its methodological foundation draws on the work of Bansak et al. (2018), as well as insights shared by Professor Kirk Bansak in a publicly available conference presentation. Together, these sources outline how GeoMatch functions as a predictive tool for refugee placement, leveraging historical data on integration outcomes to optimize matches between individuals and resettlement locations. Additional clarification provided through communication with GeoMatch personnel highlights that the model requires host countries or collaborating institutions such as those involved in refugee or asylum seeker relocation to supply the necessary data inputs for effective implementation.

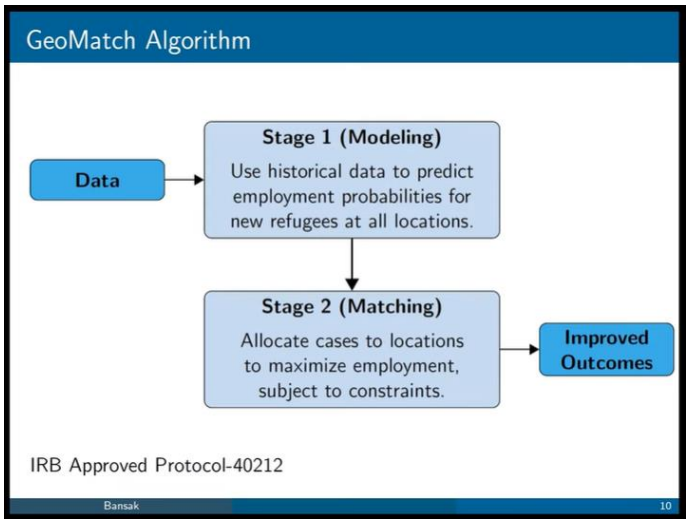

Figure 1. General overview of GeoMatch process (Centre for Refugee Studies, 2021)

GeoMatch employs a combination of supervised machine learning and optimal matching techniques to identify and leverage synergies between refugee characteristics and geographic locations. The process consists of two main stages as summarized in figure 1, the initial phase is the modelling stage, followed by the matching stage, and finally the generation of outcomes through placement recommendations. The process begins in the modelling stage, where historical data about previous immigrants who have arrived in the country is provided by the partner institution (in conversation with personnel from GeoMatch, they clarify how the data must be provided by partner countries or institutions working in refugee or asylum seeker relocation.) and then it is used to train a separate machine learning model for each potential destination. These models are designed to capture how individual features (age, education level, or health conditions) have historically influenced integration outcomes, such as employment or housing success, in each location.

According to IPL, the training of their model necessitates defining an objective outcome aligned with the preferences of partner institutions and the capacities of GeoMatch. These outcomes could be identifying increased access to employment, better salaries, or enhanced access to suitable housing. A visual summary of this modelling stage can be seen in Figure 2. In this case, the focus is on the labour integration outcomes. Hence, once the models are trained and validated, they are applied to new refugee cases to estimate how well each individual is expected to fare across different locations based on the predefined objective. The output is a matrix of predictive probabilities, representing the likelihood of a successful outcome for each refugee-location pair.

This matrix serves as the foundation for the matching algorithm, which not only considers these predicted outcomes but also adheres to real-life constraints such as refugee-specific needs (e.g., language support) and community capacity limitations, including government-imposed quotas (Samber, 2018). Such constraints have also been incorporated in pilot applications of the model, such as the prospective analysis of GeoMatch in the Norwegian context by Ferwerda et al. (2022). The representation of this model's output with the integration of real-world constraints is presented in Figure 3.

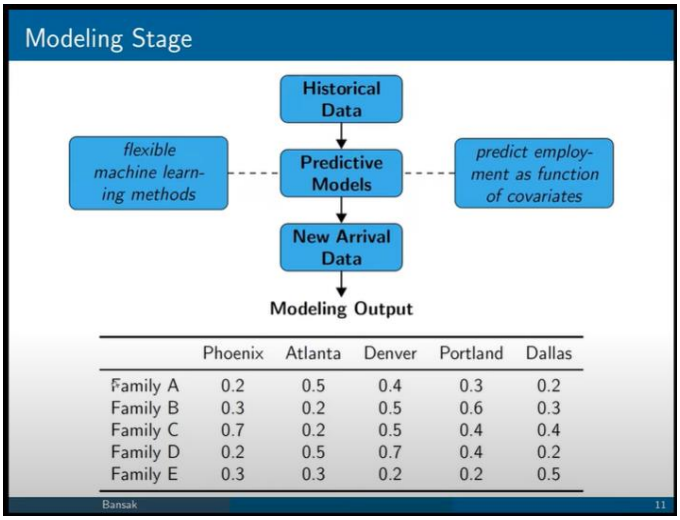

Figure 2. Modelling phase of GeoMatch (Centre for Refugee Studies, 2021)

Modeling Output with Constraints

	Phoenix	Atlanta	Denver	Portland	Dallas
Family A	0.2	0.5	0.4	0.3	0.2
Family B	X	0.2	0.5	0.6	0.3
Family C	0.7	0.2	0.5	0.4	0.4
Family D	0.2	X	X	0.4	0.2
Family E	0.3	0.3	0.2	X	X

Figure 3. Modelling phase outputs (Centre for Refugee Studies, 2021)

Upon completion of the modelling phase, the system produces a ranked list of locations, ordered by their potential to fulfil the pre-established objective. Subsequently, during the matching phase, this ranking is reviewed to determine the most and least optimal locations specifically for each individual immigrant's labour market integration, with the evaluation conducted on a case-by-case basis for every potential location. The generated ranking is designed to aid caseworkers in assigning individuals to locations offering the greatest potential for success (Hotard, 2024). A summary of this matching phase is presented in Figure 4. The GeoMatch team organizes these insights into a user-friendly platform, providing caseworkers with access to the information and the ranked list of optimal locations. Ultimately, the decision regarding the relocation of refugees and asylum seekers remains human-based, as the system functions as a recommendation tool. Exceptions to this evaluation process are made when a location has already been determined based on family integration, aligning with standard resettlement practices (Bansak, 2018).

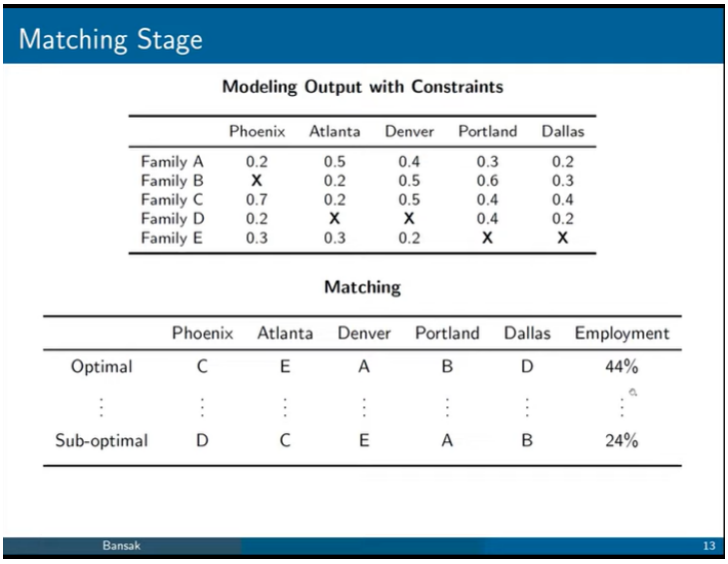

Figure 4. Matching stage and percentage of success (Centre for Refugee Studies, 2021)

GeoMatch employs a semiparametric estimation method, which is a statistical approach that combines parametric components, characterized by a fixed number of parameters, with nonparametric components that allow the model complexity to grow with the size of the data. This hybrid structure provides the flexibility to capture complex and nonlinear relationships in the data (Ichimura & Todd, 2007). Specifically, the model uses stochastic gradient boosted trees, a machine learning technique that builds an ensemble of weak learners, typically decision trees, to iteratively improve prediction accuracy. The term "stochastic gradient" refers to the use of random subsets of the data during each boosting iteration, which contributes to both computational efficiency and model robustness (Friedman, 2002).

This method combines simple models for predictable cases with decision trees capable of capturing more complex patterns. To enhance computational efficiency without sacrificing accuracy, the method incorporates random sampling. Consequently, the system is capable of generating robust and precise predictions, even when dealing with datasets characterized by high dimensionality and noise. Furthermore, GeoMatch operates under the principle of fairness in distribution. Its algorithm is intentionally designed to prevent systematic bias in favour of or against any demographic group. Instead, the focus is on identifying the optimal location for each individual case, thereby ensuring that considerations of equity and individual potential are central to the relocation process.

In regards to Annie™ the system operates by first collecting internal data from past resettlement cases operated by the HIAS over the previous ten years. Then the model applies a machine learning algorithm to detect patterns linking refugee characteristics to successful employment in specific communities. Based on these insights, the algorithm predicts the employment prospects for newly arriving refugees across the HIAS network of partner communities. Resettlement organizers use these predictions to allocate refugee families in a way that maximizes employment outcomes, while still adhering to constraints such as refugee-specific needs (e.g., language support) and community capacity limitations, including government-imposed quotas. In doing so, Annie™ aims to improve the economic integration of refugees while ensuring that placement decisions remain feasible and consistent with institutional and legal requirements (OPSI, 2020).

In addition to its predictive modelling capabilities, Annie™ integrates an optimization algorithm that enables resettlement agencies to operationalize these predictions under real-world constraints. The model uses a two-stage architecture: first, employment probabilities are predicted using historical data and machine learning models, such as LASSO and Gradient Boosted Regression Trees (Ahani et al., 2021). Then, these predictions are used as inputs in an integer linear program designed to maximize aggregate employment across incoming refugee cohorts, while ensuring that placement decisions remain feasible under a wide range of constraints. These include both hard constraints such as the availability of medical services, language access, or housing, and soft constraints like affiliate workload balance or individual preferences.

The Annie™ framework allows users to enable or disable restrictions and ignore algorithmic suggestions, preserving decision-maker autonomy while increasing the transparency and evidence-basis of their choices. Through simulation using real placement data, the authors found that this model could improve short-term employment rates by 22% to 38%, depending on the number and type of constraints applied (Ahani et al., 2021). This dual-layered system of prediction and optimization illustrates how AI-based tools can align institutional limitations with integration goals, without excluding the human perspective in final decision-making.

5. METHODOLOGICAL FRAMEWORK: INTERVIEW METHOD, SAMPLE STRUCTURE, AND ANALYSIS

This chapter outlines the methodological framework employed in this study, which explores the institutional, technical, and ethical conditions that shape the deployment of AI-based tools in migration management. Grounded in a comparative-exploratory research design, the study focuses on two illustrative cases and draws on expert interviews with AI developers and migration officials from Canada and Norway. The chosen approach reflects the early stage of AI implementation in this domain and aligns with sociotechnical perspectives that emphasize the entanglement of technological systems with broader institutional and normative environments.

The research design, interview strategy, sampling logic, and analytical process are structured to respond to the central and sub-research questions of the study. The interviews were guided by the Data Ethics Decision Aid (DEDA) framework and enriched through projective techniques to surface both explicit and latent views of the participants. Thematic analysis was applied to identify and interpret patterns across the dataset, ensuring that insights from both the technical and public sector perspectives are systematically captured. Together, these methodological choices enable a nuanced and critical examination of how AI tools are perceived, evaluated, and potentially integrated within migration governance systems.

5.1. Research Design

Given that the use of AI in migration management is already being partially implemented or at least tested on a limited scale in selected countries like Switzerland, Germany, the US, or The Netherlands (Bither & Ziebarth, 2021), while remaining entirely theoretical in others, this study is undertaken with a comparative-exploratory research design. This approach is well-suited for contexts where the impacts of emerging technologies are still being assessed, and where conclusive findings have yet to be reached (Olawale et al., 2023). The research design outlines the decision-making processes, conceptual framework, and analytical techniques employed to address the study's central research question and to achieve the research objectives (George, 2021). In this context, the exploratory research methods enable scholars to begin with broad conceptualizations and

progressively narrow their focus as the investigation evolves (Olawale et al., 2023). Such approach is particularly suitable for establishing initial priorities, formulating operational definitions, and refining subsequent stages of the research process, especially when examining under-explored or poorly defined phenomena (Olawale et al., 2023).

Exploratory research design is particularly suited to analyse the potential implications of AI for migration management as this approach in accordance with Stebbins (2001) is relevant for examining under-researched or emerging phenomena where existing theory is limited or fragmented. In that sense, exploratory studies aim to investigate a research problem that has not been clearly defined, often by gaining new insights, clarifying concepts, or identifying key variables and relationships (Babbie, 2010). Thus, rather than seeking to test hypotheses or measure causal relationships, exploratory research emphasizes flexibility, openness, and depth which allows the researcher to adapt the inquiry as new data and patterns emerge (Yin, 2014).

Considering the evolving role of AI in migration governance and the still-limited number of real-world applications, a comparative-exploratory approach is particularly well suited for this research. First, it facilitates a comparative critical examination of the technological tools GeoMatch and Annie™ that are still in early stages of development or have only undergone limited testing (Ahani et al., 2021; Andersson et al., 2018; Bansak et al, 2018; Ferwerda et al., 2022). Second, it enables a contextual analysis of how institutional frameworks, actors, and ethical considerations influence the perceived potential and limitations of these innovations (Kudina and van de Poel, 2024) both from the AI developers perspectives and the civil servants in migration units in North America and Norway.

The selection of a comparative-exploratory study aligns with the aim of researching under the sociotechnical perspective proposed by Kudina and van de Poel (2024), which emphasizes the need to assess AI within its broader social and institutional context, as well as with Bovens and Zouridis (2002) theoretical framework on the evolution of public bureaucracies in response to technological change. Furthermore, this thesis explores not only the technical dimensions of AI but also the sociotechnical and normative implications within migration management, particularly in the area of refugee and asylum seeker integration.

AI in migration management for asylum seeker and refugee integration remains a conceptually ambiguous and empirically underexplored field, as such tools are not yet widely standardised in public sector practices (Bircan & Korkmaz, 2021). In this regard, the research aligns with Stebbins (2001) and Olawale et al. (2023) characterization of exploratory studies as those that seek to lay the groundwork for future research by identifying patterns, ideas, or hypotheses, rather than testing or confirming them.

Moving forward, Bither and Ziebarth (2021) describe how AI is being implemented in migration governance and migration management across three primary dimensions. The first involves the use of decision-support systems to evaluate visa applications from third countries. In this context, migration officials rely on data-based systems to inform decisions about individual cases, thereby streamlining and standardizing administrative processes. The second dimension, as explored by Carammia et al. (2022) and Angenendt et al. (2023), concerns the use of predictive algorithms to forecast migration flows. These systems enable governments to anticipate migratory trends and better prepare their reception infrastructures, according to their national approaches on migration and policy frameworks. The third dimension—central to this dissertation—pertains to the use of AI for refugee and asylum seeker integration, particularly in relation to improving economic and labour market outcomes (Bither & Ziebarth, 2021).

Consequently, the comparative-exploratory study is complemented by a qualitative research approach, incorporating expert interviews, document analysis, and a comprehensive literature review. This methodological combination enables a nuanced investigation of how public officials in countries considering the adoption of AI tools, as well as the developers of such tools, perceive both the potential and limitations of AI in migration management.

Given that AI technologies operate within complex sociotechnical systems (Kudina & van de Poel, 2024), a qualitative approach is particularly well-suited to move beyond a purely technical assessment and to address the political, social, and institutional dimensions of algorithmic governance. Expert interviews, in particular, are essential for uncovering the values, assumptions, and constraints that shape the design, implementation, and reception of AI-based decision-support systems for refugee and asylum seeker management.

The exploratory dimension of the research also included contacting migration and resettlement officials from the Netherlands, Switzerland, Norway, and Canada. The Netherlands and Switzerland were especially relevant to the study, as both countries have engaged in pilot implementations of GeoMatch (Hotard, 2024). However, due to the confidentiality agreements associated with the testing phase, officials from these countries were not permitted to discuss the project publicly, this was clarified through direct communication with a representative from the Swiss State Secretariat for Migration (Deputy Head of the Personnel, Information and Communication Division) who indicated that official statements regarding the piloting of the aforementioned tool are restricted until 2026. In contrast, officials from Canada and Norway were willing to share their views on the potential role of AI in refugee and asylum seeker integration processes.

5.2 Interview Method

In order to better understand how GeoMatch and Annie™ models operate, a section within the methodology presents how these AI-based systems collect and process data and how recommendations are presented to public officials. In addition, interviews were conducted with individuals involved in both initiatives. On the GeoMatch side, several members of the IPL were contacted, although only one interview was ultimately conducted. Nevertheless, the selected interviewee was a high-ranked official who was able to provide substantial insights into the tool's functioning, requirements, and limitations. On the Annie™ side, multiple developers and officials were contacted, and interviews were conducted with both technical developers and non-technical resettlement caseworkers. These conversations were particularly valuable for understanding not only how the tool functions but also how it interfaces with the human capital involved in the decision-making process.

The design of the interview protocol was informed by both the theoretical framework guiding this dissertation (Bovens & Zouridis, 2002; Kudina & van de Poel, 2024) and specially the Data Ethics Decision Aid (DEDA) framework developed by the Data School at Utrecht University (Schäfer et al., 2022). DEDA has been created to support data analysts, project managers, and policymakers in identifying ethical issues that arise in data-based projects, including data governance and policy-making (Schäfer et al., 2022).

The framework is particularly well suited for group discussions or focus groups within organizations. In its original application, DEDA involves two facilitators, one to moderate the session and one to document responses.

The DEDA framework consists of three main parts: The first includes nine contextual questions related to the project's name, goals, stakeholder landscape, and duration (Schäfer et al., 2022). The second section comprises 17 questions focused on data-related considerations across six dimensions: algorithms, data sources, automation, visualization, accessibility, and data reuse or open access. The third and final section includes 21 general ethical considerations, divided into six additional dimensions: responsibility, communication, transparency, privacy, bias, and future scenarios (Schäfer et al., 2022). This structure enables a systematic and participatory approach to anticipating ethical risks and opportunities in algorithmic systems.

Building on this structure, the DEDA framework (Schäfer et al., 2022) was primarily used to inform the development of two of the three main sections of the semi-structured interview guide: the descriptive and analytical sections. The descriptive questions were designed as an introductory section and to bring out concrete information from participants. In the case of developers, these questions focused on briefly describing how the AI models function, including aspects related to system architecture, operational logic, user interaction, and data management. In contrast, for public officials, the descriptive section aimed to understand how AI tools have been considered or implemented for migration management. Both groups were also asked to specify the types and sources of data used by these systems, a critical point given concerns about opacity and potential black-box effects that have been problematized in the literature (Angenendt et al., 2023).

Accordingly, to ensure that the interview design was both structured and ethically grounded, the descriptive and analytical sections of the interview guide were directly informed by the dimensions outlined in the DEDA framework (Schäfer et al., 2022). The descriptive questions, which focused on how the AI models operate, how they are perceived or implemented by public officials, and the nature and origin of the data used, were primarily based on the second part of the DEDA framework: data-related considerations (Schäfer et al., 2022). Specifically, these questions drew from the dimensions of algorithms, data sources, automation, visualization, accessibility, and data

reuse or open access, allowing for a detailed understanding of the technical and operational foundations of the systems.

In contrast, the analytical questions were shaped by the third part of the framework: general ethical considerations (Schäfer et al., 2022). These questions addressed topics such as the understanding of the conceptual differences between asylum seekers and refugees, the ethical implications of these distinctions, and the use or absence of ethical or governance frameworks in practice. Accordingly, the analytical section corresponded with the DEDA dimensions of responsibility, communication, transparency, bias, privacy, and future scenarios. This alignment ensured that the interviews systematically explored both the technical and ethical dimensions of AI in migration management.

Besides the DEDA framework (Schäfer et al., 2022), the final section of the interview protocol was based on projective techniques as outlined by Soley and Smith (2008). These techniques, grounded in a psychoanalytic tradition, are designed to uncover deeper beliefs, values, and assumptions that may not be explicitly stated by participants. Projective methods are often used in the social sciences to elicit higher-level thought processes through indirect questioning or the presentation of hypothetical scenarios (Soley & Smith, 2008). While originally associated with visual methods in sociology and anthropology, such as photographic focus groups and thematic appreciation measures, the underlying principle of projecting the views of the audience onto imagined situations can be extended to qualitative interview design (Conner, 2009). In this study, projective techniques were incorporated into the last section of the interview guide by presenting tailored hypothetical scenarios to both developers and public officials.

For instance, developers were asked how they would advise a government interested in adopting AI-based solutions for migration management, while Canadian and Norwegian officials were invited to imagine either advising or being advised from another country or a development team based on their own experience or expectations. These questions through scenarios were designed to go beyond surface-level opinions and to reveal the underlying beliefs of the interviewees about what institutional, technical, and ethical conditions are necessary for the successful implementation of such systems (Soley & Smith, 2008).

In practice, this approach resulted in a methodological blend, where elements of DEDA (Schäfer et al., 2022) structured ethical inquiry were complemented by projective scenarios (Soley & Smith, 2008) aimed at exposing deeper reflections on future applicability, stakeholder readiness, and cross-national learning. Furthermore, it is worth noting that, due to the semi-structured nature of the interviews, additional follow-up or context-specific questions were also introduced organically during the conversations to capture relevant insights beyond the initial scope of the interview protocol.

5.3. Sample Structure

At the time of the data collection phase, Canada is in the preliminary stages of negotiation with the IPL to adapt and test a version of GeoMatch for migrant integration. In contrast, Norway has implemented AI exclusively to support administrative tasks such as documentary categorization, interview transcription, or questionnaire formulation. In the Norwegian case, the broader role and potential application of AI in the asylum seeker and refugee resettlement process remain under internal discussion, as the nation evaluates the capabilities, requirements, and limitations of AI within its migration management framework.

The interviews with Canadian and Norwegian officials were central in shaping both the scope and methodological focus of the dissertation. Most notably, they highlighted the gap between theoretical advancements and policy realities. While academic discussions on predictive analytics for migrant integration are emerging in both contexts (e.g.; Bansak et al., 2018 and Ferwerda et al., 2022), in many cases AI remains in its early stages of consideration within public institutions. This reinforces the relevance of adopting an exploratory research design (Olawale et al., 2023), as it allows for a deeper understanding of perceptions, expectations, and institutional readiness surrounding the deployment of AI in the public sector. Even in the absence of full implementation, insights from these conversations offer a window into how the future of AI in migration management is currently being imagined and negotiated.

Overall, participants were selected based on their professional experience with either the development or potential implementation of AI-based migration tools. For GeoMatch, the selection focused on individuals directly affiliated with the IPL, while for Annie™, both

technical developers and resettlement professionals from HIAS were approached. For the governmental perspective, officials were selected based on their engagement in migration policy, particularly in departments exploring or evaluating the integration of algorithmic tools, Immigration, Refugees and Citizenship office in the case of Canada, and the Directorate of Immigration in the case of Norway. The criteria ensured a balance between technical and policy-oriented viewpoints, as well as between tools in use and tools under consideration.

Table 2. Overview of Interviewees and Contributors

Role	**Organisation**
High-ranked representative and developer	Immigration Policy Lab (IPL), institution behind the development of GeoMatch
Senior Official	Norwegian Directorate of Immigration (UDI), Department of Statistics
Senior Advisor	Norwegian Directorate of Immigration (UDI)
High-ranked representative	Office for Permanent Economic Immigration, Immigration, Refugees and Citizenship Canada (IRCC)
High-ranked academic representative	Worcester Polytechnic Institute (WPI), partner institution behind Annie™ MOORE

5.4. Analysis

The analytical questions were also shaped by the DEDA framework guidance (Schäfer et al., 2022), with a focus on ethical reasoning and stakeholder awareness. For developers, these questions explored their understanding of the conceptual and legal distinctions between asylum seekers and refugees, and the implications of those distinctions for the performance and fairness of algorithmic matching tools. For public officials, the questions explored whether data availability varies between these two humanitarian categories and how such differences may affect policy implementation or model training.

Additionally, both groups were asked to reflect on the use or absence of ethical or governance frameworks in the development and deployment of the models. These inquiries aimed to assess not only whether such frameworks were applied, but also how they influenced project design, transparency, fairness, and perceived legitimacy.

Once the interviews were conducted, the collected data was prepared for qualitative analysis. The interviews were transcribed and analysed using thematic analysis, a method well-suited for exploratory studies seeking to identify patterns, meanings, and categories across qualitative datasets (Braun & Clarke, 2006). Thematic analysis was chosen for its flexibility and applicability to semi-structured interviews, allowing the researcher to draw both inductive insights emerging from the data and deductive links to the guiding theoretical frameworks (Bovens & Zouridis, 2002; Kudina & van de Poel, 2024).

The analysis followed Braun and Clarke's six-step process: (1) familiarisation with the data, (2) generating initial codes, (3) searching for themes, (4) reviewing themes, (5) defining and naming themes, and (6) producing the report. Manual coding methods were employed to identify key themes aligned with the dimensions of the DEDA framework and projective scenarios, particularly focusing on perceptions of ethical concerns, technical requirements, institutional constraints, and stakeholder expectations. This allowed for an in-depth comparative interpretation of the insights from both AI developers and public officials involved in migration management.

6. RESULTS

This chapter presents the findings resulting from the thematic analysis of semi-structured interviews conducted with key stakeholders involved in the design, implementation, and institutional consideration of AI tools for migration management. The analysis focuses primarily on perceptions surrounding GeoMatch. The core insights are based on interviews with three actors: (1) the developer, referring to the senior representative from the IPL, which is the organization responsible for GeoMatch; (2) two senior migration officers from the UDI Norway; and (3) a senior migration officer from IRCC Canada.

To enrich and contextualize the findings, this chapter also includes insights from a written response and peer-reviewed publication provided by one of the academic senior developers of the Annie™ project. While Annie™ was not treated as a primary case study, its inclusion serves to offer comparative reflections from another AI-based resettlement initiative, allowing for broader engagement with the technical, institutional, and ethical dynamics shaping algorithmic decision-making in migration governance.

The findings of this study are organized thematically to reflect both the most relevant patterns that emerged from the interviews and the analytical structure derived from the research subquestions. The overarching goal is to explore how public officials and developers perceive the opportunities and limitations of AI in migration management, and how illustrative tools like GeoMatch and Annie™ address the ethical, technical, and institutional implications associated with algorithmic decision-making in this domain. To increase clarity and interpretive coherence, the results are grouped under two broad sections, each corresponding to one of the research subquestions.

The first section grouped under the heading “Sociotechnical Conditions Shaping AI Deployment”, explores the institutional, technical, and contextual factors that influence how AI-based tools are designed, implemented, and understood by developers and migration officials. These include governance and institutional readiness, contextual variation and adaptability, data infrastructure and access, predictive modelling and machine learning, and legal and institutional frameworks. Collectively, these themes address the first subquestion: How do public officials and AI developers understand the sociotechnical factors influencing the design and implementation of AI-based tools in the public sector?

On the other hand, the second section grouped under the heading “AI, Practices, and Discretion”, engages with how stakeholders understand the implications of AI for bureaucratic structures and decision-making processes. The subsection on risk, uncertainty, and resistance delves into institutional concerns and cautious attitudes toward AI implementation. Subsequently, the other subsection covers five cross-cutting but interrelated issues: ethical and privacy concerns, integration outcomes and success metrics, human versus algorithmic decision-making, automation in public administration, and co-design and stakeholder engagement. These findings refer directly to the second subquestion: How do public officials and AI developers perceive the impact of AI on bureaucratic structures and public sector decision-making?

Finally, the last section of the results presents a summary of findings, exploring the most relevant conclusions and connecting them back to the overarching research questions, while setting the stage for the discussion and conclusion chapters that follow.

6.1. Sociotechnical Conditions Shaping AI Deployment

6.1.1. Governance & Institutional Readiness

Among the themes developed from the interviews with senior migration officers from UDI (Norway), ICCC (Canada), and the developer as representative from the IPL behind GeoMatch, Governance and Institutional Readiness emerged as the most frequently referenced and conceptually robust. Based on the extracted keywords and the broader context of the interviews, this theme may be defined as the capacity of state institutions to effectively plan, coordinate, and implement migration-related policies and technological innovations at the national level. It involves a range of factors including normative frameworks, investment priorities, technical infrastructure, interagency coordination, and the prevailing institutional attitude towards digital transformation within the public sector. Several sub-themes are also part of this category, specifically, financial budgeting, internal regulatory guidelines, and digital literacy among staff. As confirmed by both interview insights and findings from the literature review, these elements are instrumental in shaping whether AI-based tools, particularly those reliant on machine learning and predictive analytics, can be developed, piloted, or integrated into existing institutional structures.

From the perspective of developers, governance and institutional readiness is a critical precondition for the deployment of AI-based matching tools. Institutional arrangements such as which entities hold legal authority over migration decisions, how data is governed and accessed, and what ethical or regulatory standards apply, directly influence whether such tools are viable. During the interview with a developer from IPL, it became evident that national data ecosystems vary substantially. In some countries, like the Netherlands and Switzerland, where GeoMatch is currently under pilot projects, migration-related administrative data is managed centrally by statistical authorities (e.g., Centraal Bureau voor de Statistiek in the case of the Netherlands). In contrast, in the U.S., where integration of refugees is handled by resettlement agencies such as HIAS, this panorama creates the decentralised governance that allow these agencies to collect, manage, and utilise their own datasets which are conditions that facilitated the early deployment of Annie™ and later GeoMatch.

These institutional characteristics have direct implications for the feasibility of algorithmic matching. They shape the network of actors involved at local, national, and increasingly academic or non-state organizations such as IPL. This highlights a key point: the integration of AI-based tools must align with the legal and procedural frameworks that govern migration status determination, in that sense, many of the characteristics held by GeoMatch are not standard and depend on the specific context where the model is implemented. For instance, in the European context, where responsibilities are often distributed across multiple governmental bodies, questions of interoperability and data-sharing protocols become part of the broader governance equation. In contrast, in the U.S., where responsibilities are concentrated among non-governmental resettlement agencies, developers operate under a different set of constraints and opportunities.

The Norwegian case provides a particularly compelling example of how institutional readiness extends to definitions and categorizations. One of the senior migration officials from the UDI noted that distinctions between "refugee" and "asylum seeker" are not merely legal classifications but are shaped through institutional negotiations with international actors such as the UNHCR. In Norway, refugee quotas are pre-negotiated annually in cooperation with the UNHCR, while individuals who arrive independently at airports or land borders are processed as asylum seekers. While these distinctions are crucial during the initial phase of reception and legal processing, they become less significant in the integration phase. Once protection status is granted, both refugees and

asylum seekers are subject to the same integration policies and programs. As such, the application of AI tools like GeoMatch for integration purposes would not depend on the initial categorization, but rather on whether individuals have been formally recognized as beneficiaries of protection.

Deepening into Governance and Institutional Readiness, this theme is composed of at least three distinct but interconnected dimensions which are also related to three subthemes of the topic. The first dimension concerns the level of digital literacy and technical competence among institutional stakeholders. These capacities directly influence how actors engage with innovation and determine their willingness to implement new technologies in migration policy. In Norway, a senior official emphasized that before any technological adoption can occur, the foremost priority is to "build competence" within the organization. This involves hiring staff capable of understanding how AI works, the implications of these tools for the functioning of migration systems and their impact on the lives of refugees and asylum seekers.

In Norway's case, this competence must be developed internally, partly due to regulatory requirements and data protection concerns, as will be discussed in the following section. In contrast, the Canadian perspective as reflected in the interview with a senior official, suggests a model where institutional competence is complemented by partnerships with specialized research institutions such as the IPL. In this model, external expertise is not only accepted but relied upon to provide the analytical and technical foundations for AI deployment. From the developers' perspective, IPL representatives expressed a willingness to adapt to the institutional needs of each partner, noting that their level of involvement depends on "where the partner feels comfortable". This indicates a flexible model in which the success of AI integration is closely tied to the institutional capacity and preferences of each context.

The second dimension pertains to the internal conceptual architecture of migration governance, specifically how migrants are classified and how these classifications influence data usage, eligibility, and policy priorities. This was particularly evident in the contrast between Canada and Norway. Canadian authorities have expressed interest in leveraging GeoMatch not for refugees or asylum seekers, but for economic migrants. Their goal is to redirect migratory flows away from large urban centres toward less populated regions with labour shortages. As stated by the Canadian official, this strategy

is intended to increase the success rate of integration while alleviating demographic pressures in high-density areas. In contrast, Norway, as previously discussed, legal and institutional distinctions between refugees and asylum seekers carry significant weight during the early phases of status determination but become less relevant in the integration phase. Nevertheless, such distinctions shape how AI tools could be applied and the legal constraints surrounding their use.

For IPL, understanding this internal architecture is crucial. Developers must map the institutional ecosystem, identifying whether migration decisions are managed through centralized public institutions or through decentralized entities like resettlement agencies, as in the U.S. These differences influence not only how data is collected and used but also how decision-making authority is distributed across actors. According to the IPL representative, one of the first steps when deploying a tool like GeoMatch is to map existing workflows to identify potential entry points for algorithmic support. Importantly, the tool is designed to function as a complement to, not a replacement for, human judgment.

However, the degree to which this ideal can be realized depends on the structural constraints of each country. In the U.S., refugee placement is heavily influenced by the logistical capacity of resettlement agencies. In Norway, placement is governed by a quota-based system in which approximately 350 municipalities (kommuner) are pre-assigned intake capacities. According to Norwegian officials, these quotas are the primary determinant of where individuals are placed, limiting the space for personal preferences from migrants or matching the synergies between personal and geographic characteristics. This highlights a key challenge: the successful implementation of AI matching tools depends not only on their technical capabilities but also on the flexibility of existing institutional frameworks.

Therefore, GeoMatch not only serves as a predictive tool for migrant placement but also offers partner institutions a deeper understanding of their existing operational frameworks. Through its analytical capacities, the model can reveal patterns in existing resettlement practices, thereby supporting a review of procedural dynamics that enhances institutional awareness of where individuals have historically been relocated and what outcomes have followed. This functionality is particularly valuable in contexts where decision-making processes are often reliant on fragmented or informal tools such as ad

hoc team meetings to determine placements. By exploring how these traditional systems function, AI models like GeoMatch can identify areas for improvement and propose data-based enhancements, while remaining embedded within the institutional realities and constraints of host countries.

In that sense, from the perspective of developers, AI-based tools like GeoMatch are seen not as revolutionary disruptions to institutional workflows, but as natural extensions of existing technologies already embedded in migration decision-making, such as spreadsheets or digital platforms used to coordinate case discussions. This framing implies that the integration of machine learning models would not necessarily require radical shifts in legal or institutional structures. Rather, the emphasis is placed on complementarity, where AI enhances rather than replaces human judgment.

Finally, the third dimension of governance and institutional readiness concerns the financial and budgetary frameworks required for the development and deployment of AI tools in migration management. As previously noted, these dimensions, digital literacy, internal architecture, and budgeting are deeply interconnected and often mutually reinforcing. In the Norwegian case, internal regulatory frameworks stipulate that any technological tool integrated into the public sector must be developed in-house. According to senior officials from the UDI, this legal requirement restricts the possibility of outsourcing development to external providers, thereby placing the constraint of design and implementation entirely on public institutions. These rules significantly shape the budgeting process, as in-house development of AI models requires substantial financial and human capital. As one official remarked, such investments are currently feasible only on a small scale, limiting the scope of innovation to pilot projects rather than full-scale deployment.

In contrast, from the perspective of the developers at the IPL, financial constraints are less pronounced. Regarding the case of GeoMatch, IPL representatives emphasized the availability of philanthropic and institutional support for initiatives aimed at improving migration policy. They noted a growing interest among funders in supporting evidence-based approaches to migration governance, which increases the likelihood of securing the necessary resources for tool development and testing. A more intermediate view was offered by the Canadian migration official, who acknowledged that while funding remains a challenge, it is one that can be addressed through strategic cooperation. In

particular, the deployment of tools like GeoMatch for the integration of economic immigrants has been framed as a collaborative effort that leverages academic and policy partnerships, allowing for cost-free implementation within certain operational scopes. This dimension underscores how legal frameworks, institutional structures, and access to funding jointly influence whether and how AI innovations are pursued in public sector contexts. In sum, institutional readiness is shaped by digital literacy, conceptual clarity around migration categories, and the structural characteristics of the policy system. AI tools like GeoMatch can be adapted to various contexts, but this adaptability requires an in-depth understanding of how decisions are made, who is involved, and what legal and operational boundaries exist in each country.

Senior developer explicitly suggested that institutions should not begin by asking what regulatory changes are required to implement AI, but instead by critically reflecting on their current use of data: how it is stored, accessed, and applied in decision-making processes. This approach underscores the foundational assumption that public institutions already engage in data-based governance, and thus AI represents a scaling of existing capabilities rather than a categorical transformation. However, this proposition also invites scrutiny: while spreadsheets may be used informally, they rarely operate at the scale or opacity of machine learning algorithms, nor are they typically designed to predict outcomes for vulnerable populations using sensitive personal data. These tensions, which comprise ethical, legal, and infrastructural dimensions, will be further explored in subsequent sections. Nonetheless, the developer view that AI can be seamlessly introduced into current workflows without substantial regulatory review reflects a distinct and possibly optimistic interpretation of institutional readiness.

In fact, a critical dimension of governance and institutional readiness identified through the interviews is the role of data in shaping migration management and decision-making processes. The senior representative from the IPL emphasized that institutional readiness goes beyond technical capacity, as it also depends on the willingness of governments to reassess how policy success is defined and to engage in paradigm-shifting discussions about the use of data. From this perspective, data-based innovation such as the use of predictive analytics for integration presents an opportunity to enhance both policy design and migrant outcomes. However, this requires institutional openness to testing new tools, which in turn demands both political will and a supportive regulatory environment.

This idea is complemented by insights from the senior official at the IRCC, who argued that risks associated with technological innovation in migration management could be mitigated through voluntary implementation frameworks. By allowing migrants to be advised by algorithmic recommendations, predictive systems could operate without imposing outcomes, thereby minimizing the ethical risks associated with automation and preserving individual agency. This position aligns with Canada's current approach to skilled economic migration, where individuals, upon receiving their status, typically retain the autonomy to choose their place of residence. In this context, algorithmic tools such as GeoMatch could enhance decision-making by offering additional evidence-based suggestions without restrictive freedom of movement.

In contrast, the Norwegian approach to refugee resettlement as illustrated through the interviews with senior officials at the UDI, follows a more directive model grounded in the legal and institutional responsibilities of the state. Once refugee status is granted, individuals are assigned to specific *kommuner* based on predefined quotas and administrative capacity. While these individuals may also possess educational or professional backgrounds, their mobility is constrained by the policy frameworks in place, which are designed to ensure an equitable distribution of responsibilities among local authorities. In such settings, predictive tools would be integrated not as advisory instruments for individual choice, but as mechanisms to optimize institutional decision-making within existing governance structures. This divergence underscores how national legal frameworks and migrant categories (economic versus humanitarian) fundamentally shape the potential roles and ethical considerations of AI in migration management.

In summary, as identified through the data collected, governance and institutional readiness is not only a matter of infrastructure or interest; it is a multifaceted construct shaped by national policies, governance models, data protection norms, and legal constraints. These factors collectively determine whether emerging technologies in migration management are viable, scalable, and ethically implementable in different country contexts.

6.1.2. Contextual Variation & Adaptability

Contextual variation and adaptability are critical considerations in the deployment of AI-based tools for migration management. While closely related to governance and

institutional readiness, this theme emphasizes the external conditions and structural particularities that shape how and when such technologies can be meaningfully implemented. Context refers to the broader ecosystem in which migration policies and digital innovations are introduced, including legal traditions, policy objectives, and jurisdictional boundaries. Therefore, understanding the specificities of context is essential for evaluating the feasibility of data-based decision-support tools and for tailoring implementation strategies to local realities.

Contextual variability is a central consideration in the design and deployment of AI-based tools. The developer explicitly acknowledges that while the core elements of migrant integration such as employment outcomes or demographic profiling may be consistent across jurisdictions, their operationalization differs significantly depending on the legal, institutional, and socio-economic context. From data management and access protocols to ethical and regulatory frameworks, the developers emphasize that each implementation must be tailored to local norms and constraints. According to the IPL representative, this contextual adaptation is not merely technical. It is also imperative to ensure that the technology enhances, rather than undermines, the well-being and rights of migrants.

In the case of individuals granted refugee or asylum status, the developer from IPL emphasized that a placement decision is inevitable: “someone is going to be choosing the location for this person.” Given this unavoidable step, they argue that AI-based tools like GeoMatch offer an opportunity to provide “that additional piece of information so [decision-makers] can make a better decision.” While acknowledging that the status quo varies across national contexts, ranging from discretionary judgments by placement teams to attempts at weighing multiple factors. They suggest that the tool is designed to reflect and complement these existing practices. As they explained, “the tool tries to consider those same factors and provide an additional piece of information for them to consider.” To ensure contextual alignment, the developer advocates for a piloting strategy that enables host countries or localities to test and refine the tool before full-scale deployment. This approach, they argue, facilitates adaptation to the operational needs, institutional goals, and regulatory constraints of each setting.

In that context, the interviews with senior migration advisers revealed that the institutional framing of AI as a supportive and non-decisive tool would play a critical role in shaping its acceptance and potential deployment within migration management

systems. This perspective was especially evident in the Canadian context, where authorities acknowledged both the early-stage development and the potential of tools like GeoMatch. Rather than relying on such tools for final decision-making, Canadian migration officials currently project GeoMatch to be functioning as a recommendation system, offering data-informed guidance to economic migrants about regions where their profiles may align more strongly with labour market demands. In this context, AI serves to complement, not replace, human judgment.

Similarly but with different considerations, in Norway, one of the senior migration officers described their institutional culture as inherently risk-averse, particularly in relation to innovation within the migration domain. Although Norwegian authorities recognize the potential of AI to enhance migrant outcomes, they explicitly avoid positioning migration services as experimental or testing grounds for new technologies. As the official put it, “we do not want our sector [migration] to be the first to test these tools in the public sector”. Consequently, AI applications in Norway have been limited to administrative functions such as automatic transcription of interviews with asylum seekers and document categorization, where the output is clearly advisory rather than authoritative.

In these cases, the recommendation-based nature of AI remains intact and is perceived as compatible with legal and ethical expectations. These findings underscore how the perceived function of AI, whether as a recommendation mechanism or a decision-making authority, significantly shapes its legitimacy in public sector contexts. Framing AI tools as *supportive systems* rather than *deterministic decision-makers* appears to be a decisive factor in whether or not such tools are deemed suitable for implementation. In this light, the governance and cultural context of each institution becomes central to the negotiation of AI's role in migration management.

One more finding from the conversation with the Canadian migration officer and with the developer turned into one of the specific subthemes within context variation and adaptability, was the role of labour market dynamics. This subtheme refers to how the capacity of the labour markets to absorb incoming migrants can influence both the tool's effectiveness and the political feasibility of its implementation, especially in the context of refugees.

From a policy perspective, matching individual backgrounds with labour market demands offers a compelling rationale for AI-enhanced placement. Moreover, piloting GeoMatch can reveal not only where employment opportunities exist, but also what structural improvements local labour markets might require becoming more inclusive and competitive in the long term. In this regard, AI tools do not merely react to existing conditions, they can also serve as diagnostic instruments that inform broader policy adjustments aimed at facilitating successful migrant integration.

In connection with the insights from Canadian authorities, the IPL developer emphasized the importance of robust data management to understand the synergies between migrants' personal backgrounds and the geographic characteristics of host communities, an intersection they see as key to improving integration outcomes. While they acknowledged that the status quo is often perceived as a comfortable or default approach, they stressed that introducing AI into decision-making processes requires effort and institutional adaptability. This adaptation, though potentially demanding, is seen as worthwhile: by improving refugees' conditions and enabling quicker access to labour markets, the system helps "get people on an equal footing rather than creating artificial barriers that… will have large downstream effects." In doing so, AI-supported integration has the potential to ease the long-term burden on public institutions, particularly by reducing the need for ongoing financial support and thereby allowing them to reallocate resources toward other pressing areas of governance.

An additional factor emphasized by the developer relates to the limitations of predictive models in capturing the everyday realities that shape operational decisions. While AI tools like GeoMatch can identify patterns and synergies through data analytics, they lack awareness of the on-the-ground constraints that only human actors can perceive. For instance, IPL has received feedback from partner organizations indicating that a local migration officer had left their position or that an office was temporarily closed due to maintenance which are situations the model cannot detect or account for. These kind of contingencies reaffirm the central role of public officials and resettlement agencies in interpreting and applying algorithmic recommendations. As the developer noted, it is ultimately human actors within the public sector who understand their local context and are best positioned to judge when and how to integrate AI-supported insights into decision-making processes.

6.1.3. Data Infrastructure & Access

A foundational but often underestimated prerequisite for the implementation of AI tools in migration management is the availability and accessibility of structured, high-quality data. As the developer of GeoMatch plainly stated, “the tool does need data. I think that's really a hard constraint.” Without a robust data infrastructure, even the most advanced models remain speculative in practice. As such, data infrastructure and access is considered to be related to how administrative or historical data is accessed, stored, or used for modelling, it also includes privacy safeguards, systems, or limitations.

Across different national contexts, officials repeatedly pointed to data-related limitations as core barriers to implementation. In Norway, for example, a senior migration officer explained that AI-driven matching is “very difficult” precisely because it “requires a lot of data and that is difficult to manage.” Another official highlighted the fragmentation between digital systems, noting, “we have an archive system that is not fully integrated with the case-under system,” which makes it difficult to retrieve documents necessary for model training and development. Similarly, Canadian stakeholders emphasized the importance not only of technical access but also of maintaining transparency and public trust: “it's really important to explain to clients how we're using their data, why we're using it… and how the algorithm works.” Together, these insights reveal that conversations about the potential of AI in migration management cannot be decoupled from the material and institutional realities of data governance. Without the proper infrastructure and access protocols in place, implementation remains aspirational rather than operational.

The interviews revealed that data infrastructure and access are core determinants of the tangible conditions that shape governance and institutional readiness. The capacity to implement AI tools for migration management depends heavily on whether institutions can retrieve, process, and safeguard relevant data across systems. Importantly, the way data is managed varies significantly across national contexts, reflecting differing institutional logics and levels of digital maturity. In the case of the pilot project in the Netherlands, the IPL developer explained that Statistics Netherlands (CBS) facilitates access to existing administrative datasets through a controlled research environment. Researchers must apply to use the data and work within a secure virtual environment (VPN). Additionally, any analytical outputs generated must be reviewed and approved by

CBS before they can be released. This model ensures both data security and cost-efficiency, as it leverages already available administrative data without requiring additional data collection efforts. In Canada, the ICCC official highlighted a similar structure, in which statistical and technical staff assess the sensitivity of datasets and determine which information can be shared with external actors such as IPL. In both cases, data infrastructure and access is not exclusively about having data, rather it is also about how data is classified, accessed, and operationalized within predefined legal and ethical boundaries.

On the other hand, in the case of Norway, migration officials expressed a shared understanding with developers that access to data is a foundational requirement for the implementation of AI tools. As one senior official put it, “data is the gasoline for these kinds of projects”. However, despite the existence of a robust data warehouse within the UDI, significant portions of asylum-related information remain in unstructured formats, making them unsuitable for machine learning training. Specifically, approximately 3.3 million documents related to asylum cases between 2010 and 2023 are stored outside of the main data infrastructure, rendering them inaccessible for algorithmic use.

With the aim to address this challenge, UDI's statistics department has signed a collaboration agreement with the University of Oslo to organize these records and integrate them into the existing data systems. This partnership includes the use of Robotic Process Automation (RPA) to structure the data; this approach is seen as essential given the scale of the task and the limitations of relying solely on manual processing. As one official acknowledged, the magnitude of the issue had been largely underestimated: “We had not thought about it before, until we had to do it”. These efforts illustrate how technical constraints around data management and archiving can delay the deployment of AI tools, even in contexts with otherwise strong digital infrastructures.

According to Norwegian migration officials, even when large volumes of data are available, their direct integration into AI systems is neither feasible nor desirable without prior preparation. As one senior official explained, “you can’t just put an AI into our case handling systems… that’s not possible when it comes to information security, and we can’t just let something go loose in there.” Instead, sensitive data must be extracted from operational systems and transferred to a secure, separate environment where it can be cleaned, structured, and tested for potential use. This separation is essential not only for

safeguarding personal information but also for enabling controlled experimentation and model development. In the context of the ongoing collaboration between UDI and the University of Oslo, this step involves organizing millions of unstructured documents through RPA before any algorithmic model for integration or placement matching can be considered. Such processes highlight the preparatory nature of data work, and the institutional safeguards required before any deployment decisions can be made.

While RPA is not necessarily a prerequisite for AI deployment in migration management, from the interview with senior migration officers, it has emerged as a valuable tool for automation within the public sector. In the case of Norway, migration officials noted that although AI tools have not yet been implemented at UDI, RPA technologies are already in use across several administrative processes. As one official explained, "we use automated processes in many cases, and also robotics RPA… but we have not yet implemented AI." This reflects a broader trend where governments seeking to organize large volumes of unstructured data may rely on RPA as a preparatory mechanism. In such contexts, RPA can support the structuring of data and improve information management, thereby facilitating the future consideration of more complex algorithmic models.

In terms of the data required for AI-supported integration matching, both the Canadian official and the IPL developer emphasized the importance of relying on historical information from previous migrant cohorts. This data, when made accessible and usable, can support the simulation of potential integration outcomes across different geographic locations. As the Canadian official explained, "we have extensive tax data on immigrants… we've used that to build the model," referring to datasets managed by the national statistical agency. Similarly, the developer pointed to the relevance of sources such as wage, tax, or employment records, noting that "oftentimes these data may exist, but it's hard to get to." Beyond the mere existence of data, both interviewees underscored the importance of ensuring that such information can be accessed, processed, and repurposed in a manner compatible with predictive modelling. This highlights a key dimension of data infrastructure: the ability not only to store but also to operationalize administrative datasets for strategic use in AI development.

Although organizations like IPL play a key role in developing and advising on AI-based solutions, their capacity to access and use data ultimately depends on whether a country has already established a structured and secure data environment. The ability to classify,

organize, and grant access to administrative data which is often in compliance with strict legal and ethical frameworks, is a responsibility that rests primarily with governments or designated partner institutions, such as resettlement agencies in contexts like the US. Given the decentralized nature of statistical systems and the national specificity of data governance, it would be unrealistic to expect external developers to take the lead in structuring this data. Instead, their role is typically limited to working within existing infrastructures and advising on technical possibilities. This structural dependency becomes especially apparent in contexts where data remains unstructured or fragmented, as illustrated in the case of Norway.

Beyond the technical and institutional requirements for AI deployment, the developers emphasized a deeper, paradigmatic issue: the way governments conceptualize their relationship with data. Rather than viewing data merely as an administrative byproduct, the developer encouraged institutions to treat it as a strategic asset capable of informing and improving migration governance. They pointed out that many agencies still rely on fragmented tools such as spreadsheets or case team meetings to make placement decisions, with limited integration between systems and little capacity for longitudinal tracking or evaluation. This, according to the developer, hinders the ability of institutions to answer critical questions such as: What constitutes a successful integration outcome? Are placements being made equitably across regions, or effectively for individual cases? Are lessons from past placements being used to improve future decisions? These reflections call for a shift away from passive data collection toward a more active, iterative, and outcome-oriented use of data.

Moreover, the developer noted that while AI tools like GeoMatch are often compatible with existing legal and regulatory frameworks, their adoption still requires careful institutional review. As machine learning-based systems increasingly fall under the umbrella of "AI-enhanced" technologies, countries may be required to conduct impact or privacy assessments before implementation. However, these are not necessarily barriers to use, but rather procedural steps to ensure alignment with emerging AI governance policies. In this context, GeoMatch is framed not only as a predictive tool but as a catalyst for institutional transformation, a way for governments to reflect on how data is used, what success looks like, and how to reduce structural barriers to integration. The developer stressed that even prior to deploying advanced tools, governments can begin by asking foundational questions about how data is collected, shared, and evaluated. In

doing so, AI implementation becomes not simply a technical upgrade but a reflection of a broader shift in governance logic towards more responsive, data-informed migration systems.

In summary, as reflected across the interviews with developers, Canadian advisers, and Norwegian migration officials, the ability to implement AI tools for migration management depends crucially on the maturity of a country's data infrastructure. Organizations like IPL are ready to test and refine AI-based models, however, their potential relies on governments having well-established, structured, and secure data environments. In Canada, the Netherlands or Switzerland, longstanding institutional frameworks allow controlled access to the administrative datasets on which model development is based. Meanwhile, in the Norwegian context as well as in many other countries, significant volumes of data exist in unstructured formats, posing a common challenge to immediate AI deployment. In these settings, governments and designated partners share the responsibility of enhancing their data ecosystems by organizing, cleaning, and operationalizing datasets within clearly defined legal and ethical frameworks. Without these foundational systems in place, any consideration of using AI for matching and integration risks remaining aspirational rather than actionable.

6.1.4. Predictive Modelling & Machine Learning

Following the assessment of governance readiness, contextual factors, and data accessibility, the next prominent theme emerging from the interviews concerns the actual design, application, and testing of AI systems through predictive modelling and machine learning. This theme involves how algorithmic tools are conceived and applied for decision support in migration management, including the types of models used, the variables selected, and the interpretability of their outcomes. It also reflects the perspectives of both developers and migration officials regarding the current and potential roles of AI, ranging from abstract possibilities to actionable implementations. Closely linked to this is the theme of pilot projects and experimentation, which captures the ongoing proof-of-concept initiatives, testing environments, and the evaluation of algorithm performance. Together, these dimensions highlight how predictive tools are being developed, adapted, and tested within institutional settings, revealing both their technical boundaries and their potential to shape future migration governance.

GeoMatch was initially developed to support refugee resettlement decisions by optimizing the alignment between individual profiles and local integration conditions. According to the developer, its first applications took place in the United States in collaboration with resettlement agencies and the U.S. State Department, responsible for determining refugee status under the UNHCR programmes. Although the tool is no longer actively used in the U.S. due to changing migration policy priorities, it has since been adopted in new humanitarian contexts. Through IPL's institutional affiliations with ETH Zurich, ongoing partnerships have been established with Switzerland and the Netherlands to pilot the tool in support of asylum seekers. These initiatives are still ongoing with results not expected before 2026.

In the same way, as part of their efforts to expand the tool's humanitarian scope, IPL is also exploring a collaboration with UNHCR in Mexico, where a placement programme and relevant integration outcomes data are already in place. As the developer noted, "they have a really interesting placement program there, but they also have outcomes data that they are collecting". For IPL, the feasibility of such partnerships is closely tied to data availability: "a key question for any potential partner is, like, what data exists?… It's easier to understand and explore with specific contexts." These emerging cases reflect an effort to embed AI tools within existing humanitarian frameworks while ensuring alignment with each country's institutional capacities and data ecosystems.

In contrast, as explored earlier, while AI tools for integration matching have not yet been implemented in Norway, the UDI is actively engaging in proof-of-concept initiatives to explore the broader implications of AI within migration management. Currently, the focus lies in testing AI to support administrative processes rather than decision-making regarding labour market integration. One of the main pilot projects involves the use of AI-powered speech recognition during asylum interviews. Whereas human operators were previously responsible for note-taking and transcribing these interviews, the new system automatically generates transcripts and can also suggest follow-up questions in real time. Moreover, AI models are being piloted to assist caseworkers in the classification of asylum-related documents. For example, when applicants submit supporting materials, the system can automatically categorize them, for example into health records, legal documentation, or policy reports, therefore simplifying the processing. According to UDI officials, these administrative applications are already helping to reduce costs and alleviate workloads for public servants.

Furthermore, the analysis of the alignment between personal characteristics and geographic opportunities has attracted interest from new actors and expanded the potential application for GeoMatch. As one Canadian official explained, “its original conception was really to help… refugee resettlement officers,” but current discussions involve using the same machine learning infrastructure to assist economic immigrants in identifying destinations where “they might be most successful economically based on their profile.” From the developer's perspective, this signals a shift toward more decentralized, client-driven models.

Reflecting on prior explorations in the U.S., IPL developers have noted the potential for “a recommendation tool for asylum seekers moving to a few large cities and many times kind of overtaxing these locations,” suggesting that a version of GeoMatch could allow migrants themselves to receive guidance, particularly in contexts where centralized placement mechanisms are absent. As they put it, “in other contexts, that might not exist, and it may not be a hard constraint.” This broadened scope positions GeoMatch not only as a decision-support tool for governments, but as a flexible infrastructure adaptable to various governance models and migrant categories.

Returning to the case of Norway, the institutional and technical characteristics of the UDI reveal important constraints on the piloting and testing of AI in migration management. During interviews with senior officials, a clear pattern of risk aversion emerged, particularly with regard to predictive modelling and the use of AI. One official described the organizational stance as cautious, remarking, “It’s been a couple of years now… where, you know, the world is, ‘Oh my God, AI is gonna be, it’s gonna be a revolution,’ you know? Well, it’s a very slow revolution, if it even is a revolution. It takes a long time for things to happen, and we are also… we don’t want to be first in migration management in our field.” These statements reflect broader concerns about data security, legal compliance, and the reputational risks associated with adopting high-stakes technologies prematurely. In particular, fears around potential breaches of the GDPR and anticipated obligations under the forthcoming EU Artificial Intelligence Act appear to influence decision-making. As such, the slow pace of AI integration within UDI is not merely a technical issue, but also a reflection of institutional risk cultures and evolving regulatory frameworks.

The statements made by the Norwegian migration official, particularly regarding AI being framed as a "revolution" and concerns about its energy consumption, suggest a possible misunderstanding of the type of AI relevant for migration management and labour market integration. As clarified by the Canadian migration official, “it’s not like generative AI or anything like that… it’s machine learning.” Hence, while generative AI and machine learning are related, they differ in purpose and complexity. Machine learning involves training algorithms on historical data to make predictions or classifications, whereas generative AI like ChatGPT produces new content such as text or images based on learned patterns. According to the developers, GeoMatch is based on machine learning, relying on past migrant data to generate evidence-based recommendations. This distinction is essential, as some of the current discourse around AI adoption may be shaped more by generalized perceptions of AI than by an understanding of the specific technologies involved.

A final reflection on GeoMatch concerns its adaptability to different policy contexts, institutional environments, and implementation goals. As emphasized by the developers at IPL, there is no single, fixed version of GeoMatch. Rather, the tool is designed to be tailored to the specific needs, constraints, and data environments of each project. Every time a new project or agreement is done, a new GeoMatch is created. In this sense, GeoMatch functions more as a flexible framework than as a standardized product, one that can evolve across humanitarian and non-humanitarian domains alike.

This modular and context-sensitive design allows IPL to collaborate with partners at varying levels of institutional readiness, while also responding to diverse policy objectives. Ultimately, GeoMatch represents a portfolio of matching integration models with the potential to innovate migration policy and contribute to more coordinated, responsive, and effective resettlement strategies.

6.1.5. Legal & Institutional Frameworks

Legal and institutional frameworks refer to the formal and informal normative structures that guide how governments and public institutions operate, adapt, and make decisions. These frameworks include not only legislative instruments and jurisdictional mandates, but also softer forms of regulation such as administrative guidelines, internal protocols, and procedural norms. For example, beyond formal legislation, an agency’s internal

policy on data classification or technology procurement may strongly influence whether and how algorithmic tools are adopted. Insights from interviews with migration officials and AI developers reveal that these frameworks play a critical role in determining the geographic scope and operational scale at which AI tools like GeoMatch can be deployed.

One of the most immediate constraints imposed by legal and institutional arrangements concerns the level of territorial distribution used for migration-related decisions. As the developer explained, GeoMatch has had to adapt to distinct units of governance depending on the country: in the US, recommendations were made at the city level, aligning with the availability of field offices; in Switzerland, the relevant unit was the canton; and in the Netherlands, the tool operated at the level of labour market regions. Similarly, Norwegian migration officials emphasized that once an individual is granted protection status, they are typically assigned to a specific *kommuner*. These jurisdictional differences are not merely technical distinctions; they shape the ways in which integration strategies are implemented and, consequently, the kinds of outcomes that AI tools can realistically influence. In this sense, legal and institutional frameworks do not just regulate technology, they co-define its design, limits, and expected impact within national migration systems.

In addition to defining territorial boundaries, legal and institutional frameworks also establish the ethical and governance standards that must be met for AI tools to be legally and legitimately implemented. These frameworks outline the procedural, normative, and regulatory conditions under which data-based models can operate. According to the developer, IPL intentionally avoids imposing a fixed ethical or governance model across all contexts. Instead, the development and deployment of GeoMatch are co-designed in close collaboration with partner institutions to ensure alignment with local norms, laws, and operational procedures. As the developer explained, “within a context, we typically do kind of work within an established regime.”

This approach reflects IPL’s recognition that governments and resettlement agencies are the experts in their own domains. “We see them as the experts in their context, and we want to follow their lead in terms of what their general policies and practices are and what is going to help them”. Rather than dictating implementation protocols, IPL adapts its tools to meet the governance requirements set by institutional partners; an approach that

reinforces the notion that ethical AI must be contextually embedded rather than universally prescribed.

Although it may appear counterintuitive, legal and institutional frameworks can influence not only whether AI tools are permitted, but also the degree of complexity they are perceived to embody, particularly in relation to their scope and application within the public sector. This emerged in conversations with Norwegian migration officials, who suggested that certain AI tools, such as those used for speech recognition and document classification, are viewed as relatively low-risk and operationally equivalent to traditional administrative tools like spreadsheets.

Despite being subject to GDPR and related regulations, these systems are often considered as routine instruments for internal support functions rather than transformative and complex technologies. A similar line of thinking was noted by the IPL developer, who observed that in many contexts, decisions around refugee placement are already made using existing tools such as spreadsheets or case review meetings. “Sometimes these are manual spreadsheets… sometimes it might be team meetings where they’re discussing cases,” as explained by the developer, framing GeoMatch as a natural extension of these decision-making processes.

However, perceptions around the complexity and regulatory significance of AI tools like GeoMatch have shifted over time. As the developer noted, “more and more countries [are] starting to put in kind of AI policies, and because we use machine learning, that is often considered an AI-enhanced tool.” While such classification does not necessarily require legal changes, it may trigger obligations such as privacy or algorithmic impact assessments, depending on the national context. What may have once been viewed as a basic decision-support system is now increasingly scrutinized under evolving AI governance frameworks. This evolving interpretation of AI’s regulatory relevance highlights how institutional perceptions rather than technical complexity alone shape the legal categorization and oversight of algorithmic tools in migration governance.

Legal and institutional frameworks also play a decisive role in distinguishing between high-risk and lower-risk applications of AI in migration governance, particularly in drawing a boundary between decisions related to legal status determination and those related to post-decision integration or resettlement. As clarified by both Canadian

officials and IPL developers, GeoMatch is explicitly designed to operate only after protection status has been granted. “There’s no… impact on the outcomes of somebody’s integration application,” explained the Canadian official. “It has nothing to do with the processing of an actual application.” Similarly, the developer emphasized that “the tool does not make any eligibility determinations,” noting that it is used only once “a placement officer is deciding where they should recommend this person for resettlement.” In this sense, GeoMatch is situated clearly outside the legal domain of refugee recognition or benefit eligibility, thereby avoiding direct entanglement with the most sensitive and legally protected decision-making processes in migration systems. By respecting this boundary, the tool operates within a lower-risk legal space, focused instead on supporting administrative coordination and integration strategies.

In addition to delimiting the scope of decision-making, legal and institutional frameworks also define the degree of discretion available to authorities in the context of placement, pilot implementation, and data protection. For example, in Norway, while UDI is responsible for granting protection status, the reallocation of status holders is further constrained by pre-established quota systems and legal rules on who can decide the final destination, which could be the caseworker or, in some cases, the migrants themselves, based on personal preferences. Moreover, the introduction of AI tools must conform to national rules regarding automation and due process. As one Norwegian official noted, “it’s illegal to have negative automated decisions,” emphasizing the legal mandate for human oversight in all protection-related determinations.

Similarly, Canadian officials highlighted the importance of transparency and informed consent when piloting new tools, stressing that “it’s really important to explain to clients how we’re using their data, why we’re using it… and how the algorithm works.” These insights illustrate how legal and institutional frameworks regulate not only the core migration procedures but also the conditions under which technological experimentation and innovation can be carried out. From quota allocation to data governance, legal structures profoundly influence the ways in which algorithmic tools can be designed, tested, and implemented in migration systems.

6.2. AI, Practices, and Discretion

6.2.1. Risk, Uncertainty & Resistance

One of the most prominent sources of institutional uncertainty around AI adoption in migration governance relates to the interpretability of machine learning models. When asked about the extent to which IPL developers can identify the specific factors used by the GeoMatch algorithm to generate recommendations, the response revealed a key limitation: “typically, the machine learning models that we use for GeoMatch don’t allow a lot of that level of interpretation,” the developer explained, noting that they do not produce individualized explanations regarding which predictive characteristics were most influential for a given recommendation. This lack of transparency points to the potential presence of black box effects, where even those involved in the tool’s development face challenges in understanding its internal logic. However, the developer emphasized that the model's overall structure still offers a degree of traceability. Specifically, the system generates scenarios for each predefined location, that is, cities or regions selected in advance by the implementing partners. Later, it produces a ranked list based on the predicted likelihood of employment. This allows for a general understanding of how recommendations are structured, even if the precise influence of individual predictive variables remains inaccessible.

Despite these interpretability constraints, the IPL team demonstrated awareness of the equity-related risks associated with predictive modelling. Acknowledging that different demographic groups such as those defined by gender, age, or nationality, may not experience equal gains from AI-supported placement, the developers have implemented monitoring mechanisms to assess group-level outcomes. “We want to make sure that no group is harmed by the tools,” the developer explained, “and so far we haven’t seen that in any of the monitoring that we’re doing.” While they do not expect perfectly equal outcomes across all populations, efforts to prevent disproportionate disadvantage reflect a proactive approach towards risk mitigation. In this way, the IPL approach illustrates a form of limited risk tolerance, recognizing the inherent uncertainties in machine learning applications while seeking to reduce potential harms through ongoing evaluation and oversight.

Another category of risk identified by participants relates to the operational limitations of AI systems, particularly in tasks such as document classification. A Norwegian migration official noted that although AI has been introduced to assist in sorting and categorizing documents, the presence of a margin of error remains likely. To mitigate this, caseworkers retain full responsibility for reviewing the documentation associated with their assigned cases. “I guess there is a margin of error … but it really helps because we receive many, many documents at the unit for the evaluation”. This human-in-the-loop approach serves as a safeguard against the unintended consequences of overreliance on automation and highlights the importance of maintaining human oversight, even in low-stakes, administrative use cases.

A second layer of risk, shared by both Norwegian and Canadian officials, involves the ethical and legal challenges of working with sensitive data from vulnerable populations. Officials underscored the difficulty of designing AI tools in a context where much of the data is incomplete, unstructured, or difficult to access. These data quality issues increase the risk of inaccurate or biased recommendations, particularly in placement or integration-related decisions. Furthermore, privacy and confidentiality emerged as core ethical concerns across all interviews. As one Norwegian official put it, “protection is important, so ensuring the privacy and confidentiality of individuals is fundamentally important in any AI system dealing with migration data.” Similarly, the Canadian official emphasized the challenges of hosting such tools in secure environments: “we’re dealing with personal information here to create the recommendations… all of that needs to be scrubbed, and… we need to be respectful of all of the various privacy legislations.” These statements point to a shared institutional awareness that the deployment of AI in migration contexts must be accompanied by robust safeguards to prevent harm, protect rights, and maintain public trust.

Norwegian officials also emphasized the legal and regulatory uncertainty surrounding the implementation of AI in migration management, highlighting the risks associated with being among the first in the public sector to adopt such technologies in a sensitive policy domain. One senior adviser expressed this concern directly: “It takes a long time for things to happen, and we are also... we don’t want to be first in migration management in our field.” This reluctance to lead reflects a broader institutional hesitancy rooted in the unpredictability of both outcomes and future regulatory changes. Officials noted that initiating pilot projects without clear precedents could expose the institution to

reputational or legal risks, particularly if evolving laws such as national AI strategies or the forthcoming EU AI Act, could cause early-stage experimentation to be non-compliant with regulations. In this context, the perceived risk is not only about the functionality or ethics of the tools themselves but also about the uncertainty of the regulatory environment. As such, previous themes such as data governance, legal frameworks, and ethical accountability all intersect to shape a cautious, risk-averse posture toward AI within Norwegian migration institutions.

A final area of consensus between Norwegian and Canadian officials concerns the risks associated with designing and deploying AI tools without adequate sensitivity to local contexts. Both emphasized that technological infrastructure, legal systems, and institutional practices vary widely across countries, and that models developed in one setting cannot be simply applied to another. A Norwegian official noted that "When it comes to technology and, you know, infrastructure, it's very local… it's not something that translates easily to a different country".

Similarly, the Canadian representative highlighted the need to "understand the historical, the geographic, the legal frameworks" to ensure that comparisons and applications remain valid and meaningful. These insights underscore the importance of contextual adaptability and call into question the viability of universal, generic AI solutions for migration governance. Even when drawing on successful international pilots, any new implementation must be grounded in a careful evaluation of the technical, legal, and social conditions that define the target environment.

Despite the shared cautious posture held by institutional stakeholders, the Canadian official expressed a comparatively higher tolerance for risk, acknowledging the limitations of predictive tools while advocating for iterative, evidence-informed refinement. "They understand the strengths of the recommendation, but also the weaknesses," they remarked, emphasizing that the tool offers guidance rather than guarantees: "It's not a guarantee that you're gonna do better." This pragmatic view accepts that algorithmic recommendations may sometimes be inaccurate, but sees this as a challenge best addressed through use, monitoring, and adaptation rather than avoidance. As they noted, "There's the risk that the model is not accurate… so that is a risk, and we will be mitigating that by following outcomes and adjusting the model as we go." In this sense, the Canadian case reveals an institutional mindset open to experimentation, one

that views responsible deployment not as the absence of risk, but as the ability to learn from and respond to it in real time.

In sum, the theme of risk, uncertainty, and resistance reveals that the adoption of AI in migration governance is shaped not only by technical feasibility but by varying degrees of institutional caution, legal sensitivity, and ethical awareness. While concerns around interpretability, data quality, and regulatory ambiguity foster a generally risk-averse posture (particularly among Norwegian stakeholders) there are also emerging examples of pragmatic risk tolerance, as seen in the Canadian case. Across all contexts, the perceived risks of AI implementation are deeply entangled with broader governance frameworks, trust in data systems, and context-specific operational realities. These findings underscore the importance of maintaining a balance between caution and innovation, where the responsible use of AI is enabled through transparency, adaptability, and continuous institutional learning.

6.2.2. Cross-Cutting Issues

In addition to the primary themes explored in earlier sections, the interviews surfaced several other relevant yet less prominent themes. While these topics appeared with lower frequency in the data, they still provide valuable insight into the broader dynamics shaping the design, implementation, and perception of AI in migration governance. These themes include ethical and privacy concerns, integration outcomes and success metrics, human versus algorithmic decision-making, automation in public administration, and co-design and stakeholder engagement. Taken together, they reflect the complexity of deploying algorithmic tools in sensitive policy environments and reveal both convergences and divergences in how different stakeholders understand and negotiate their respective roles and responsibilities.

One of the more surprising findings was the relatively limited explicit reference to ethics as a standalone theme, despite its implicit relevance across nearly all other areas of concern. This suggests that while ethical considerations are embedded in discussions of legal compliance, data use, and institutional readiness, they are often overshadowed by more immediate technical or procedural concerns. As noted previously in the Legal and Institutional Frameworks section, IPL developers rely on the ethical and governance frameworks established by their institutional partners. “We have conversations around

privacy and concerns about that," the developer explained, "and so we want to make sure that we are following our partners' guidelines and intentions on the types of data we use." In practice, this means adapting to diverse data governance protocols, such as the secure VPN-based access model regulated by Statistics Netherlands which is an arrangement that may look entirely different in other contexts. IPL's ethical approach is thus enacted through local compliance rather than through the imposition of a universal ethical framework.

Moreover, the developer framed ethical engagement not just in terms of principles but as a set of practical, ongoing actions. One central strategy involves maintaining system-level monitoring to assess how the tool is functioning in real time: "We always want to develop some type of monitoring to understand what the tool is doing… that the recommendations it's making are as expected." Such mechanisms are designed to identify and address deviations early, reinforcing ethical accountability through technical oversight.

However, this decentralized and adaptive approach to ethics stands in partial contrast to the expectations expressed by some migration officials, particularly those from Norway, who anticipated clearer guidance from developers regarding ethical implications and definitions of success based on previous deployments. This illustrates a form of interdependence between government agencies navigating AI adoption for the first time and developers with technical expertise and experience in implementation. While developers depend on host institutions for legal and ethical authorization, public officials may simultaneously look to developers for normative and operational clarity, revealing a co-constructed, but at times asymmetrical, ethics infrastructure.

The question of how to define "success" in AI-supported migration policy emerged as a subtle but significant theme across the interviews. Although rarely addressed in formal terms, the concept of success was implicitly tied to each stakeholder's institutional mandate, policy goals, and ethical considerations. One Norwegian official explicitly raised this issue, asking what outcome metrics are being prioritized in countries currently piloting AI tools. This concern was echoed, although in a different manner, across other interviews, highlighting the diversity of perspectives on what constitutes a meaningful or desirable outcome in migration governance.

For Canadian official exploring AI applications in the context of economic immigration, success was framed in both individual and systemic terms. On the one hand, efforts are being made to incorporate migrant preferences into the recommendation process: “We’re also conceiving of doing [this]… actually bringing in a personal preference to the recommendation”. On the other hand, success is also measured by macroeconomic outcomes, particularly labour market participation: “The reason that we do economic integration in Canada is to help grow the economy”. These dual aims reflect a model where successful integration is defined by both personal alignment and economic contribution.

By contrast, Norwegian migration officials highlighted the fragmented nature of success metrics within the public sector itself. For instance, while IMDi may view success in terms of housing access or social cohesion, UDI might focus on how long protection status holders remain in their assigned kommuner. As one official remarked, “They [IMDi] might have different perspectives or interests, perhaps even in areas like labour market integration tools”. This variation underscores the institutional complexity of migration governance, where success is not universally defined but rather negotiated across different bureaucratic functions.

Another important insight from the developers is that the implementation of GeoMatch is typically negotiated around a predefined target outcome, which is most often economic in nature. As the developer explained, “typically, the outcome target has been an economic target, either employment or whether someone has employment in the first 90 days.” This reflects both the flexibility on the design of the tool and the pragmatic availability of economic outcome data, which tends to be more accessible across national contexts. While the model could, in theory, be calibrated to optimize for other social or integration-related metrics, employment outcomes remain the default benchmark around which partnerships and performance evaluations are structured.

Consequently, from the developer’s perspective, the question of success is equally multidimensional. They acknowledge that integration outcomes vary across demographic groups such as gender or age, and while some variation is expected, it becomes an ethical concern if disparities reflect systemic bias. For this reason, IPL monitors group-level outcomes to ensure that no population is disproportionately disadvantaged, a point that links performance evaluation directly to ethical oversight. Also, the developer reframed

the success debate by posing a counterfactual question: what are the ethical and policy implications of not using predictive tools at all? As they put it, “Another interesting ethical framework of the tool is thinking of the counterfactual of not using the data.” This perspective challenges the assumption that inaction is neutral and invites policymakers to consider the opportunity costs of maintaining status quo methods in the face of available innovations.

The theme of human versus algorithmic decision-making emerged as an important axis of tension and complementarity in stakeholder perspectives. From the developer's standpoint, GeoMatch has consistently been designed as a decision-support tool rather than a decision-making system. “We have always wanted the tool to be a recommendation tool and kind of augment human decisions, rather than making any decisions”. This design principle reflects a broader commitment to human-in-the-loop governance, particularly in high-stakes areas like refugee placement. As further emphasized, the tool is meant to provide “an additional piece of information,” not to replace the discretion of placement officers, who may possess context-specific knowledge that the algorithm cannot access. In this way, AI augments, rather than displaces, professional judgment.

This distinction is particularly relevant in light of concerns raised by Norwegian officials regarding the legal and ethical risks of fully automated decisions, especially negative ones. One official underscored that automated denial of protection or benefits would be unlawful, thereby necessitating human review in all such cases. In contrast, the Canadian perspective illustrated the limitations of human judgment informed primarily by informal channels such as social networks or online content. As one Canadian official noted, migrants often rely on “word of mouth, YouTube videos or just like preconceived notions about Canada.” In this context, AI offers a potential corrective by grounding recommendations in structured data rather than assumptions, thereby nudging human judgment toward more evidence-based decisions.

However, Norwegian officials drew a sharp line between decision-making tools and administrative automation. In their view, AI tools currently used for document classification or transcription (e.g., speech-to-text technologies) are fully involved in the domain of public sector automation, not decision-making. Decisions about placement and integration are made by multidisciplinary teams that evaluate cases collectively using both qualitative and quantitative inputs. As such, they do not perceive current AI

applications as challenging the human authority over core decisions. This distinction reinforces the idea that the boundary between automation and decision support is institutionally constructed and varies across governance cultures.

6.3. Summary of Findings

The thematic analysis exposed how the governance readiness plays a foundational role in shaping the feasibility of AI deployment in migration management even at the proof-of-concept stage. Readiness is conditioned not only by national and regional policies but also by the prevailing governance model in each context. While it can be strengthened through targeted interventions, it remains a dynamic and fluctuating dimension, subject to shifts in institutional priorities and emerging political interests. Closely linked to readiness is the theme of contextual variation, which reflects how migration policy is designed and operationalized differently across settings. These contextual elements ranging from administrative structures to resettlement practices define the scope and limitations of predictive tools and determine their potential applications.

Data infrastructure and access emerged as a sine qua non for any consideration of AI implementation. However, as the Norwegian case illustrated, the challenge extends beyond data availability to include data format, integration, and usability. The transition from unstructured to structured data systems remains a major challenge, even in settings where AI tools are still out of operation. Additionally, reflections from developers raised deeper questions about the future of data usage paradigms in the public sector, suggesting that algorithmic tools may catalyse broader shifts in how institutional decisions are conceptualized and executed not only in migration policy but across government services.

Finally, the findings show that legal frameworks, human–algorithm interaction, or automation debates serve as key arenas where ethical boundaries are negotiated. While ethical implementation depends heavily on national regulatory frameworks and the sovereign authority of governments, it also relies on the technical knowledge, monitoring mechanisms, and responsible design practices contributed by developers. Together, these factors shape the emerging ethics of AI in migration governance as a co-produced space, where power, expertise, and accountability intersect.

7. DISCUSSION

This chapter analyses the findings presented in the previous results section to address the central research aim: to understand the institutional, technical, and contextual conditions that enable the deployment of AI-based tools for migration management. The discussion is structured around the two subquestions guiding this study. First, it examines how public officials and AI developers understand the sociotechnical factors that influence the design and implementation of AI-based tools in the public sector. Second, it explores how these actors perceive the impact of AI, as a sociotechnical system, on bureaucratic structures and decision-making processes.

In doing so, the analysis draws on key insights from the problem setting section, particularly the conceptual contributions of Kudina and Van De Poel (2024) on sociotechnical systems, and the frameworks of Bovens and Zouridis (2002) and Buffat (2013) regarding the evolution of bureaucracy in the digital age. The chapter concludes with a reflection on the contributions of the study to existing literature, its limitations, and suggested avenues for future research in the field of AI and migration management.

7.1. Sociotechnical Factors Shaping AI Deployment

Kudina and Van De Poel (2024) propose a sociotechnical perspective for evaluating AI that underscores the critical role of human and social factors in shaping the implementation and impact of these technologies, beyond the technical expertise and infrastructure typically emphasized. Their framework encourages a holistic understanding of technology, emphasizing the interplay between three key constituents: technologies, human agents, and institutions. These elements interact dynamically, influencing how AI becomes embedded in social practices, particularly relevant in the context of AI deployment for migration management.

Within this framework, institutions are understood not merely as formal organizations, but also as the social norms and rules that both enable and constrain the interactions among human actors. This broader interpretation aligns with the findings of this study. Through the thematic analysis of interviews with AI developers and migration officials, twelve core themes were identified. Six of these emerged as dominant and were therefore analysed as primary themes, while the remaining six were treated as cross-cutting themes which means that they were relevant and insightful, though less frequently emphasized

across the interviews. The twelve identified themes can be meaningfully interpreted through the lens of the sociotechnical framework proposed by Kudina and Van De Poel (2024), with each theme corresponding to one or more of the three key constituents: technology, human agency, and institutional context. A summary of this mapping is provided in Table 3.

Table 3. Synthesis of Identified Themes onto Sociotechnical Constituents

Theoretical constituent	**Relevant themes from data collected**
Technologies	Data Infrastructure & Access Predictive Modelling & Machine Learning Cross-cutting: Automation in Public Administration
Human agents	Risk, Uncertainty & Resistance Cross-cutting: Human vs Algorithmic Decision-Making Cross-cutting: Co-Design & Stakeholder Engagement Contextual Variation & Adaptability (human input side)
Institutions	Contextual Variation & Adaptability (systemic factors) Governance & Institutional Readiness Legal & Institutional Frameworks Cross-cutting: Integration Outcomes & Success Ethical & privacy concerns

As summarized in the previous table, three of the twelve identified themes align with what Kudina and Van De Poel (2024) classify as the technological dimension of sociotechnical systems. The distribution of the remaining themes across the human agent and institutional dimensions underscores the argument that technological development does not occur in technical isolation. Rather, it is shaped and influenced by broader sociopolitical and organizational factors. Notably, at least five of the themes correspond directly to the institutional dimension, highlighting the critical role of governance

structures, legal frameworks, and organizational cultures. The remaining four themes are more closely tied to the actions, perceptions, and capacities of human agents involved in the design and implementation of AI in migration management.

Kudina and Van De Poel (2024) argue that institutions play a central role in shaping interactions between human agents and AI systems. Within their framework, culture which is understood as an informal institution has the capacity to influence how AI is appropriated and how effective it becomes, by embedding and potentially reshaping societal beliefs and expectations that are reflected in training data and implementation. This theoretical lens is reflected in the empirical findings of this study, particularly in the themes of governance and institutional readiness, contextual variation and adaptability, data infrastructure and access, and predictive modelling. These dimensions that operate as sociotechnical enablers or constraints.

In that sense, governance readiness emerged as critical even at the proof-of-concept stage. As revealed in interviews with officials from the Norwegian UDI, institutional preparedness is deeply influenced by national-level governance models and policy orientations. However, the risk-averse posture of the organization further influences its readiness to even consider AI models, particularly given the potential impact on vulnerable populations. By contrast, Canadian officials expressed a more risk-tolerant view, arguing that only through real-world deployment can the weaknesses of AI tools be identified and addressed. In this view, iteration and adaptation are integral to responsible innovation. Developers largely agree on this pragmatic perspective, positioning AI as a recommendation tool that supports rather than replacing human discretion. From their standpoint, the risks of not using AI in migration management outweigh the risks of using it, especially if appropriate safeguards and institutional checks are in place.

Further developing this argument, data infrastructure emerges as a sine qua non condition for the deployment of AI-based tools in migration management and constitutes a core element of the technological dimension within the sociotechnical framework (Kudina & Van De Poel, 2024). However, this theme can also be interpreted as a bridge between technological and institutional dimensions. As emphasized by both developers and public officials, the discussion extends far beyond the mere availability of data. It encompasses aspects such as data format, interoperability, and the broader architecture of public information systems. The fulfilment of these additional data-related requirements

depends heavily on institutional infrastructure and the capacity for stakeholder coordination to organize, prepare, and share data effectively.

Insights from the interviews revealed that many governments are still struggling to modernise outdated systems, which poses a considerable barrier to the potential integration of AI technologies. This was particularly evident in the case of Norway, a country frequently cited for its advanced data availability in migration governance (Ferwerda et al., 2022), where migration officials noted that, although data exists, access remains problematic due to its unstructured format. In response, the UDI signed an agreement with the University of Oslo to deploy Robotic Process Automation (RPA) tools to process and structure more than three million documents from asylum and refugee-related cases collected over the last decade. While this initiative aims to unlock the potential of historical data, it also illustrates that current AI deployment remains constrained by technical and institutional readiness gaps.

Similarly, Canadian authorities acknowledged that data availability alone is insufficient for model development. As a result, they collaborate with external institutions such as the IPL and in the case of HIAS they did it with academic associates at Worcester Polytechnic Institute (WPI), delegating the more technical aspects while focusing on internal regulatory and interdepartmental negotiations to create an enabling environment for AI deployment. IPL developers echoed this sentiment, explaining that they depend on their institutional partners not only for data access but also for the legal, ethical, and procedural frameworks required to use it. This emphasis on stakeholder coordination not only reinforces Kudina and Van De Poel's (2024) conceptualization of sociotechnical systems but also aligns with earlier findings from Bansak et al. (2018), who identified institutional coordination as a foundational challenge in migration policy and refugee resettlement, a challenges that predates and persists through the adoption of AI technologies.

In terms of the ethical considerations, while reviewing the academic literature on AI and migration governance, authors such as Beduschi (2021) and Bither & Ziebarth (2021) highlight the growing ethical risks surrounding the use of predictive analytics in this domain. These include not only concerns over privacy, bias, and surveillance but also deeper structural issues such as the digital divide between the Global North and South, and how new technologies are becoming increasingly embedded in everyday decision-making systems.

While these ethical debates are relevant and often prominent in academic discussions, the findings from this research suggest a different emphasis from actors directly involved in AI deployment. Both migration officials and developers acknowledge ethical concerns, but in practice, institutional readiness, data infrastructure, or contextual constraints appear to shape the actual implementation landscape more directly.

While some frameworks, such as those proposed by Beduschi (2021), advocate for the establishment of global standards to ensure ethical and effective AI deployment in migration management, other scholars including Buffat (2013) and Kudina and Van De Poel (2024) caution against assuming that universal design principles or fairness metrics can be seamlessly applied across varied governance systems. This tension between universalism and contextual specificity is echoed in the empirical findings of this study.

In practice, ethical framing is often treated as a contextual responsibility negotiated between stakeholders. For instance, developers at the IPL explicitly reject the notion of a one-size-fits-all ethical framework for GeoMatch. Instead, they place the ethical responsibility on national institutions, who they consider the domain experts to define deployment boundaries according to local governance models, legal structures, and normative expectations. This dynamic confirms that, while ethical concerns remain central in academic and policy discourse, their practical implementation is deeply shaped by institutional contexts and the sociotechnical systems in which AI tools are embedded.

In contrast, officials in Norway view ethics as a priority more strongly pushed by developers or countries where the tools are already in use. This dynamic suggests that ethical considerations are not fixed prerequisites but rather contingent outcomes of institutional negotiation, shaped by the sociotechnical ecosystem in which the technology is being embedded. Consequently, while ethics remain a significant concern, they are often mediated through broader governance and infrastructure considerations.

The sociotechnical view, as articulated by Kudina and Van De Poel (2024), is especially valuable here because it stretches beyond technical design and normative regulation. It situates AI within a system of coordinated interactions between technologies, human agents, and institutions. In practice, both AI developers and migration officials understand that the implementation of AI tools requires more than legal reform or technical functionality. It requires a process of negotiation, coordination, and mutual adaptation.

Ultimately, they see AI not simply as a tool, but as a sociotechnical process through which data infrastructure, human discretion, and institutional roles must align to support meaningful, context-sensitive innovation in migration management.

7.2. AI, Practices, and Discretion

The second part of this discussion examines how public officials and AI developers perceive the impact of AI-based tools on bureaucratic structures and public sector decision-making. Drawing on the conceptual framework proposed by Bovens and Zouridis (2002) and further developed by Buffat (2013), this section explores how the integration of digital technologies reconfigures the nature of discretion in administrative systems. These authors describe a shift from street-level bureaucracy, in which human agents exercise broad discretionary power, to screen-level and system-level bureaucracies, where ICT plays an increasingly leading and at times decisive role in shaping administrative processes.

In the context of migration management, particularly regarding the resettlement of refugees and asylum seekers, the findings reflect a dynamic debate on whether AI operates as a supportive or determining factor in decision-making. Developers and migration officials made comparisons between AI tools and previous technologies such as spreadsheets, suggesting a continuum of digital transformation in public administration. Two themes from the thematic analysis are particularly relevant: human vs algorithmic decision-making and automation in public administration. The first captures tensions and complementarities between human judgment and algorithmic recommendations in placement decisions, while the second refers to the use of rule-based process automation or robotics (e.g., speech-to-text tools) to support bureaucratic tasks without fundamentally challenging human authority.

Crucially, the ethical and political implications diverge across these two forms of technological integration. When automation is used for auxiliary tasks like document classification or data extraction, it is generally uncontroversial. However, when AI tools begin to shape outcomes such as matching individuals to resettlement locations the question of who ultimately holds decision-making power becomes more pronounced.

In this regard, the developer from the IPL emphasized that GeoMatch is designed as a decision-support tool rather than a replacement for human caseworkers. Nevertheless,

both GeoMatch and Annie™ significantly influence placement outcomes, suggesting a partial transfer of discretion to algorithmic systems. The data suggest that the implementation of these tools reflects an early screen-level bureaucracy, in which algorithms inform but do not dictate decisions. Human actors continue to validate and contextualize AI-generated recommendations. This positioning is justified by the developers themselves, who highlight the need for contextual awareness in public administration. Factors such as the number of officials, office closures during holidays, or sudden shifts in national policy are examples of variables that AI models cannot adequately account for. Thus, retaining human oversight is viewed not only as a safeguard but as a necessity for adapting AI recommendations to real-world conditions.

Norwegian officials underscored that their legal and institutional frameworks actively prevent the outsourcing of discretion to external systems, reinforcing the persistence of an early screen-level bureaucracy (Bovens & Zouridis, 2002; Buffat, 2013). By mandating in-house development of AI tools and prohibiting reliance on external systems, the legal architecture effectively limits the extent to which decision-making can be delegated to algorithms. This cautious posture reflects broader concerns about institutional accountability and the protection of individual rights, especially in sensitive domains like asylum and refugee management.

While these constraints may appear conservative, they reveal a deeper structural tension. As highlighted by both Bovens & Zouridis (2002) and Buffat (2013), the more complex and embedded digital technologies become within bureaucratic systems, the harder it becomes to modify the legal frameworks that govern them. Thus, innovation is increasingly necessary but also increasingly difficult to institutionalize. Norwegian officials expressed a deliberate reluctance to adopt AI in migration management, driven by a risk-averse approach. This cautious stance is further reinforced by legal barriers and institutional structures that restrict the delegation of decision-making to external systems, even when tools such as GeoMatch show potential in other contexts.

Moreover, although not extensively discussed in the interviews, references to the GDPR and the early implementation of the EU AI Act point to a regulatory environment that is evolving across jurisdictions. In this context, Canada and IPL exemplify a more flexible regulatory posture, treating pilot programs like GeoMatch as experimental spaces where AI can be iteratively tested and refined. The relative absence of such flexibility in Norway

illustrates how rigid legal frameworks can inhibit technological adoption, even in data-rich environments.

Buffat (2013) emphasizes that discretion in public administration is not eliminated by digital tools but transformed, often in subtle and complex ways. This notion is echoed in the findings of this study, which point to an evolving bureaucratic landscape where AI systems rather than replacing human judgment partially reconfigure it. Within screen-level bureaucracies, discretion is increasingly mediated by algorithmic outputs yet still enacted by human agents. Both the IPL developer and the Canadian migration official stressed that predictive analytics are intended to complement and not to dictate decisions, offering additional input for both caseworkers and migrants during resettlement.

Notably, the Canadian official acknowledged that human decisions in this context are often shaped by informal sources such as YouTube videos, anecdotal advice from acquaintances, or personal impressions of receiving countries. In contrast, AI models like GeoMatch provide a data-based recommendation derived from historical outcomes of past resettlements. However, this shift also introduces new challenges: it redefines the parameters of informed decision-making and subtly reallocates responsibility. Rather than neutral tools, these systems may shape expectations and outcomes in ways that are difficult to contest, especially when embedded in opaque bureaucratic processes. In this light, the cautious stance of actors like the Norwegian authorities appears not only reasonable but necessary, especially in contexts involving vulnerable populations where the stakes of error are particularly high.

A key insight from the interviews, particularly with developers, is the need to reconceptualize the relationship between decision-making and data in the public sector. While public officials often emphasize data availability or infrastructure constraints, developers like those behind GeoMatch advocate for a more foundational shift, they encourage public institutions to reflect on what data they possess, what they define as successful outcomes, and how data informs those outcomes. This perspective reveals that sociotechnical systems are not only about algorithms or ethical frameworks, but they are also about how institutions internalize the role of data in shaping public decisions.

7.3. Limitations

This study is not without limitations, particularly regarding access to certain stakeholders and the availability of institutional perspectives. While significant efforts were made to engage with developers and public officials, response rates IPL at both Stanford University and ETH Zurich, including researchers, technical experts, and affiliated personnel. Although most outreach efforts did not result in responses, one interview was successfully conducted with a key actor directly involved in the development and deployment of the GeoMatch project. For confidentiality reasons, the specific role of this individual is not disclosed, but the insights provided were highly valuable in understanding the internal functioning and conceptual framing of the tool.

Similarly, in the case of Annie™, outreach was extended to academic collaborators affiliated with Oxford University, Lund University, and Worcester Polytechnic Institute (WPI). Only academic developers from one of the institutions agreed to participate, while others did not respond or declined. Regarding HIAS, the resettlement and implementing agency, current officials were unable to participate due to competing priorities arising from recent shifts in U.S. migration policy. However, a former official with direct involvement in the early deployment and testing phases of Annie™ was able to provide valuable insights.

Access to country-level perspectives was also subject to constraints. In Canada, direct contact was established with the Director of Permanent Economic Immigration, which provided high-level insight but limited the opportunity for triangulating perspectives across hierarchical levels. In Norway, initial contact with IMDi led to redirection to the UDI, where interviews were conducted with both a head of unit and a statistics expert with a strong interest in AI applications. Efforts to engage with researchers from NORCE (Norwegian Research Centre), who had experience evaluating GeoMatch in the Norwegian context, were unsuccessful. Additionally, perspectives from Switzerland and the Netherlands which are the two countries currently piloting GeoMatch could not be included due to confidentiality restrictions that prevented officials from participating in interviews.

These access-related limitations were compounded by broader structural constraints. For instance, the exclusion of literature published in languages other than English or Spanish,

as well as the early-stage implementation of many AI tools in migration governance, restricted the availability of fully mature case studies. Nevertheless, the study offers a timely and relevant contribution, particularly as it reflects the early and evolving stages of public sector experimentation with AI. By combining academic literature with the real-world experiences of civil servants and developers currently shaping the field, this dissertation provides grounded insight into how AI is conceptualised and operationalised in migration policy design, despite the limitations in coverage.

7.4. Future of Research

Future research on AI in migration management should further investigate how these tools are perceived by migration officials across diverse geopolitical contexts, particularly in the Global South. According to UNHCR (2024), the majority of the world's refugees are hosted in less developed countries, regions which are often overlooked in current literature. Expanding the empirical focus beyond well-resourced, Global North settings would provide a more accurate picture of the institutional, infrastructural, and ethical challenges that shape AI deployment in migration policy.

Moreover, while ethical concerns surrounding the digitalization of migration governance remain vital, future studies must also evaluate the state of data infrastructures more systematically. Closing the gap between academic discourse and policy implementation requires greater attention to data availability, quality, and interoperability, particularly in contexts where digital systems are underdeveloped and not yet compatible with advanced algorithmic solutions.

In parallel, more critical attention should be paid to emerging pilot projects, such as Match'In in Germany, which bring together private, public, and academic actors to experiment with AI-based tools for refugee integration. Close examination of the design and implementation processes of such initiatives could yield valuable insights into the sociotechnical conditions and stakeholder dynamics that will shape the future of migration governance.

8. CONCLUSION

This thesis aimed to explore the institutional, technical, and contextual conditions that enable or constrain the deployment of AI-based tools in migration management. Drawing on expert interviews with developers and public officials engaged in the cases of GeoMatch and Annie™, and guided by sociotechnical and bureaucratic theories, the study contributes to a more grounded understanding of how algorithmic tools are imagined, implemented, or resisted in the context of refugee and migrant integration.

A key insight from this research is the evident contrast between academic discourse and actual policy practice. While much of the literature raises justified alarms about automation bias, ethical risks, and the implications of AI for vulnerable populations, conversations with stakeholders in Canada and Norway revealed a more restrained and cautious reality. In both contexts, there is little evidence of AI being deployed to make decisions about refugee or asylum seeker claims. Rather, these technologies are still under development, limited to experimental pilots, or used for administrative tasks. Complexities related to funding, data access, interoperability, and legal frameworks were cited as major barriers, making clear that many of the academic warnings remain hypothetical, at least for now.

This realization was one of the most important personal lessons of the thesis. Bridging the gap between the academic world and policymaking is not just about translating findings, but also about better understanding the institutional rhythms, limitations, and capacities of the public sector. As one developer from the Immigration Policy Lab put it, any conversation about AI must begin with a deeper reflection on what data is for, what outcomes are desirable, what are the success standards, and what the public sector is actually equipped to do. In that sense, this research is not only about AI, but about data and how it is governed, used, and valued in shaping migration policy.

The findings also reinforce the notion of AI as a sociotechnical system. Its potential and challenges are not inherent to the technology itself but shaped by the institutional and human infrastructures around it. While Bovens and Zouridis (2002) once described ICTs in the public sector as a means to reduce human discretion and promote standardization, today's realities suggest a recalibration. Rather than seeking to eliminate human judgment, many stakeholders now emphasize the importance of retaining discretion,

especially in morally and politically sensitive fields like migration. This signals a critical evolution: one where technology must adapt to governance, not the other way around.

In sum, this study does not advocate for or against the use of AI in migration management. Rather, it offers a critical lens on the real conditions under which such tools emerge, the values embedded in their design, and the voices shaping their future. It invites further research that is both technically informed and institutionally aware, with the aim of developing migration policies that are not only data-based, but also just, transparent, and contextually grounded.

REFERENCES

1. Ahani, N., Andersson, T., Martinello, A., Teytelboym, A., & Trapp, A. C. (2021). Placement optimization in refugee resettlement. *Operations Research*, *69*(5), 1468–1486. https://doi.org/10.1287/opre.2020.2093

2. Ajunwa, I. (2020). *The paradox of automation as anti-bias intervention*. *Cardozo Law Review, 41*, 1671. https://doi.org/10.2139/ssrn.2746078

3. Alon-Barkat, S., & Busuioc, M. (2022). Human-AI Interactions in Public Sector Decision-Making: 'Automation Bias' and 'Selective Adherence' to Algorithmic Advice. *Journal of Public Administration Research and Theory*, [1] *32*(4), 743-760. https://doi.org/10.1093/jopart/muac007

4. Amnesty International. (2021). *Dutch childcare benefit scandal an urgent wake-up call to ban racist algorithms*. https://www.amnesty.org/en/latest/news/2021/10/xenophobic-machines-dutch-child-benefit-scandal/

5. Amnesty International. (2024). *Refugees, asylum seekers and migrants - Amnesty International*. https://www.amnesty.org/en/what-we-do/refugees-asylum-seekers-and-migrants/

6. Andersson, T., Ehlers, L., & Martinello, A. (2018). Dynamic Refugee Matching. (Working Papers; No. 2018:7) https://lucris.lub.lu.se/ws/portalfiles/portal/194853043/WP18_7.pdf

7. Angenendt, S., Koch, A., & Tjaden, J. (2023). Predicting irregular migration: High hopes, meagre results. SWP Research Paper 11. German Institute for International and Security Affairs (SWP). https://www.swp-berlin.org/publications/products/research_papers/2023RP11_PredictingIrregularMigration.pdf

8. Anokhina, K. (2024). *Addressing possible bias in AI implementation within the Irish immigration system: Strategies for ethical machine learning AI in migration management through a postcolonial lens*. https://kseniiia.nl/data/pdf/Research%20Paper%20-%20AnokhinaKsenia.pdf

9. Babbie, E. (2010). *The practice of social research* (13th ed., International ed.). Chapman University. http://old-

eclass.uop.gr/modules/document/file.php/SEP187/ΒΙΒΛΙΑ%20ΜΕΘΟΔΟΛΟΓΙΑΣ/Babbie_The_Practice_of_Social_Research.pdf

10. Bansak, K. (2018). Improving refugee integration through data-driven algorithmic assignment. *Science*, 359(6373), 325–329. https://www.jstor.org/stable/26401311?seq=1

11. Bansak, K., & Paulson, E. (2023). *Outcome-driven dynamic refugee assignment with allocation balancing*. https://www.hbs.edu/ris/Publication%20Files/23-048_bd100b86-5ed1-42ee-940f-510cbaea109b.pdf

12. Beirens, H. (2022). *Rebooting the asylum system? The role of digital tools in international protection*. https://www.bosch-stiftung.de/sites/default/files/publications/pdf/2022-11/mpi_digitalization-asylum_final.pdf

13. Beduschi, A. (2021). International migration management in the age of artificial intelligence. *Migration Studies*. https://doi.org/10.1093/migration/mnaa003

14. Bijak, J., Forster, J., & Hilton, J. (2017). *Quantitative assessment of asylum-related migration: A Survey of Methodology*.

15. Bircan, T., & Korkmaz, E. E. (2021). Big data for whose sake? Governing migration through artificial intelligence. *Humanities and Social Sciences Communications*, 8(1). https://doi.org/10.1057/s41599-021-00910-x

16. Bircan, T., Salah, A. A., & Sirbû, A. (2023). *How can big data analytics help understand migrant integration?* https://webspace.science.uu.nl/~salah006/bircan23uncorrected.pdf

17. Bither, J., & Ziebarth, A. (2021). *Automating decision-making in migration policy: A navigation guide*. Migration Strategy Group on International Cooperation and Development. https://www.bosch-stiftung.de/sites/default/files/publications/pdf/2021-11/Automating%20Decision-Making%20in%20Migration%20Policy_Bither%20and%20Ziebarth.pdf

18. Blakemore, E. (2019). Human migration sparked by wars, disasters, and now climate. *NatGeo*. Retrieved April 14, 2025, from https://www.nationalgeographic.com/culture/article/migration

19. Blasi Casagran, C., Boland, C., Sánchez-Montijano, E., & Vilà Sanchez, E. (2021). The role of emerging predictive IT tools in effective migration governance. *Politics and Governance*, *9*(4), 274–285. https://doi.org/10.17645/pag.v9i4.4436

20. Blouchoutzi, A., Manou, D., & Papathanasiou, J. (2022). The regional allocation of asylum seekers in Greece: A multiple criteria decision analysis approach. *International Journal of Public Administration*, ProQuest. https://www.proquest.com/scholarly-journals/regional-allocation-asylum-seekers-greece/docview/2670464350/se-2?accountid=17215

21. Bosco, C., Grubanov-Boskovic, S., Iacus, S. M., Minora, U., Sermi, F., & Spyratos, S. (2022). *Data innovation in demography, migration and human mobility*. https://arxiv.org/pdf/2209.05460

22. Bovens, M., & Zouridis, S. (2002). From Street-Level to System-Level Bureaucracies: How Information and Communication Technology is Transforming Administrative Discretion and Constitutional Control. *Public Administration Review*, *62*(2), 174–184. https://doi.org/10.1111/0033-3352.00168

23. Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, *3*(2), 77–101. https://doi-org.kuleuven.e-bronnen.be/10.1191/1478088706qp063oa

24. Broeders, D., & Dijstelbloem, H. (2015). The datafication of mobility and migration management: The mediating state and its consequences. In I. van der Ploeg & J. Pridmore (Eds.), *Digitizing identities: Doing identity in a networked world* (pp. 242–260). Routledge. https://doi.org/10.4324/9781315756400

25. Buffat, A. (2013). Street-Level bureaucracy and E-Government. *Public Management Review*, *17*(1), 149–161. https://doi.org/10.1080/14719037.2013.771699

26. Cann, R. L., Stoneking, M., & Wilson, A. C. (1987). Mitochondrial DNA and human evolution. *Nature*, *325*(6099), 31–36. https://doi.org/10.1038/325031a0

27. Carammia, M., Iacus, S. M., & Wilkin, T. (2022). Forecasting asylum-related migration flows with machine learning and data at scale. *Scientific Reports*, *12*, Article 2166. https://doi.org/10.1038/s41598-022-05241-8

28. Centre for Refugee Studies. (2021). *Machine learning projects to assist refugees: GeoMatch & SWOT* [Video]. YouTube. https://www.youtube.com/watch?v=EUUJ53FwMzQ

29. Cheng, M. M. M., & Hackett, R. D. (2021). A critical review of algorithms in HRM: Definition, theory, and practice. *Human Resource Management Review, 31*(1), 100698. https://doi.org/10.1016/j.hrmr.2019.100698

30. Conner, C. T. (2009). Projective techniques for social science and business research. *Visual Studies*, *24*(3), 271–272. https://doi-org.kuleuven.e-bronnen.be/10.1080/14725860903106260

31. Crawford, S. E. S., & Ostrom, E. (1995). A Grammar of Institutions. *American Political Science Review*, *89*(3), 582–600. https://doi.org/10.2307/2082975

32. Cummings, M. L. (2006). *Automation and Accountability in Decision Support System Interface Design* (Doctoral dissertation, Massachusetts Institute of Technology). MIT Libraries. http://hdl.handle.net/1721.1/90321

33. Danish Refugee Council. (2021). *Foresight project*. DRC. https://red-social-innovation.com/wp-content/uploads/2021/11/Foresight-DRC.pdf

34. Delacrétaz, D., Duke Kominers, S., & Teytelboym, A. (2020). *Matching Mechanisms for Refugee Resettlement*. https://t8el.com/wp-content/uploads/2019/12/DKT-MMRR-Dec2019.pdf

35. European Asylum Support Office. (2020). *Annual report on the situation of asylum in the European Union*. EASO. https://doi.org/10.2847/384244

36. European Commission. (2021). *Feasibility study on a forecasting and early warning tool for migration based on artificial intelligence technology*. https://op.europa.eu/en/publication-detail/-/publication/5afa29f0-700a-11eb-9ac9-01aa75ed71a1/language-en

37. European Commission (2023). *EU-U.S. Terminology and Taxonomy for Artificial Intelligence*. https://digital-strategy.ec.europa.eu/en/library/eu-us-terminology-and-taxonomy-artificial-intelligence

38. Eurostat. (2023). *Migrant integration statistics – labour market indicators*. European Commission.

39. https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Migrant_integration_statistics_%E2%80%93_labour_market_indicators#Explore_further

40. Ferwerda, J., Finseraas, H., & Christensen, D. A. (2022). *The feasibility of using data-driven algorithmic recommendations for refugee placement in Norway*. https://norceresearch.brage.unit.no/norceresearch-xmlui/handle/11250/3013716

41. Freund, D., Lykouris, T., Paulson, E., Sturt, B., & Weng, W. (2023/2025). Group fairness in dynamic refugee assignment. *arXiv*. https://arxiv.org/pdf/2301.10642

42. Friedman, J. H. (2002). Stochastic gradient boosting. *Computational Statistics & Data Analysis*, *38*(4), 367–378. https://doi.org/10.1016/s0167-9473(01)00065-2

43. Geirbo, H. C., & Røste, R. (2023). Talking About Algorithms: How Can Interdisciplinary Translation in the Automation of Public Sector Casework Be Facilitated? In L. Prøitz & B. Hvinden (Eds.), *Lost in Digital Translations: Studies of Digital Resistance and Accommodation to the Welfare State in Practice* (pp. 45-64). Cappelen Damm Akademisk/NOASP. https://doi.org/10.23865/noasp.196

44. George, T. (2021). *Exploratory research | Definition, guide, & examples*. Scribbr. https://www.scribbr.com/methodology/exploratory-research/

45. Guillen, A., & Teodoro, E. (2023). Embedding ethical principles into AI predictive tools for migration management in humanitarian action. *Social Sciences*, *12*(2), 53. https://doi.org/10.3390/socsci12020053

46. Hotard, M. (2024). *GeoMatch: Connecting people to places using artificial intelligence*. Global Compact on Refugees. https://globalcompactrefugees.org/good-practices/geomatch-connecting-people-places-using-artificial-intelligence

47. Ichimura, H., & Todd, P. E. (2007). Chapter 74 Implementing nonparametric and semiparametric estimators. In *Handbook of econometrics* (pp. 5369–5468). https://doi.org/10.1016/s1573-4412(07)06074-6

48. Kudina, O., & Van De Poel, I. (2024). A sociotechnical system perspective on AI. *Minds and Machines*, *34*(3). https://doi.org/10.1007/s11023-024-09680-2

49. Langrand, M. (2024, May 24). *Between peril and promise: Using AI to predict human displacement*. Geneva Solutions. https://genevasolutions.news/science-

tech/between-peril-and-promise-using-ai-to-predict-and-avert-human-displacement

50. Maj, J., Ruszczak, B., & Kubiciel-Lodzińska, S. (2024). Towards algorithm-assisted career management – A challenge for new immigration countries. Predicting migrants' work trajectory using ensemble learning. *Central European Business Review*, *13*(5). https://cebr.vse.cz/pdfs/cbr/2024/05/01.pdf

51. Marbach, M., Vallizadeh, E., Harder, N., Hangartner, D., & Hainmueller, J. (2025). Does ad hoc language training improve the economic integration of refugees? Evidence from Germany's response to the Syrian refugee crisis. *Journal of the Royal Statistical Society Series a (Statistics in Society)*. https://doi.org/10.1093/jrsssa/qnae106

52. Match'In Projekt. (2022). Pilotprojekt zur Verteilung von Schutzsuchenden mit Hilfe eines algorithmengestützten Matching-Verfahrens. https://matchin-projekt.de/en/

53. McAuliffe, M., & Oucho, L. A. (Eds.). (2024). *World migration report 2024*. International Organization for Migration.

54. Mireuţă, S. (2024). AI and ethics. The case of refugees. *Journal of Refugee Studies*. https://www.proquest.com/docview/3089909940/fulltextPDF/25008C391F5A46B2PQ/1?accountid=28786

55. Molnar, P., & Gill, L. (2018). *Bots at the gate: A human rights analysis of automated decision-making in Canada's immigration and refugee system*. International Human Rights Program, Faculty of Law, University of Toronto & The Citizen Lab, Munk School of Global Affairs and Public Policy. https://citizenlab.ca/wp-content/uploads/2018/09/IHRP-Automated-Systems-Report-Web-V2.pdf

56. Mountz, A., & Mohan, S. S. (2022). Human migration in a new era of mobility: Intersectional and transnational approaches. *Journal of Ethnic and Migration Studies*. https://doi.org/10.1332/RFXW5601

57. Nalbandian, L., & Dreher, N. (2022). Current methodological approaches in studying the use of advanced digital technologies in migration management. *Frontiers in Human Dynamics*. https://doi.org/10.3389/fhumd.2023.1238605

58. Nowak, A. C., Razum, O., & Hornberg, C. (2023). Exploring the significance of legal status on refugees' and asylum seekers' access to healthcare in Germany—A Mixed-Method study. *International Journal of Public Health, 68*. https://doi.org/10.3389/ijph.2023.1605578

59. O'Brien, D., Wellbrock, C.-M., & Kleer, N. (2020). Content for free? Drivers of past payment, paying intent and willingness to pay for digital journalism—A systematic literature review. *Digital Journalism, 8*(5), 643–672. https://doi.org/10.1080/21670811.2020.1770112

60. Observatory of Public Sector Innovation. (2020). Annie™ MOORE (Matching for Outcome Optimization and Refugee Empowerment). OECD. https://oecd-opsi.org/innovations/annie/

61. Olawale, S. R., Chinagozi, O. G., & Joe, O. N. (2023). Exploratory Research Design in Management Science: A Review of Literature on Conduct and application. *International Journal of Research and Innovation in Social Science, VII*(IV), 1384–1395. https://doi.org/10.47772/ijriss.2023.7515

62. Page, M. J., McKenzie, J. E., Bossuyt, P. M., Boutron, I., Hoffmann, T. C., Mulrow, C. D., … & Moher, D. (2021). The PRISMA 2020 statement: an updated guideline for reporting systematic reviews. BMJ 2021, 372. https://doi.org/10.1136/bmj.n71

63. Pakarinen, P., & Huising, R. (2023, March 2). Relational Expertise: What Machines Can't Know. *Journal of Management Studies*, *60*(1), 204-233. https://doi.org/10.1111/joms.12915

64. Qi, H., & Bircan, T. (2023). Modelling and predicting forced migration. *PLOS ONE, 18*(4), e0284416. https://doi.org/10.1371/journal.pone.0284416

65. Rampazzo, F., Rango, M., & Weber, I. (2023). *New migration data: Challenges and opportunities*. https://library.oapen.org/bitstream/handle/20.500.12657/61285/978-3-031-16624-2.pdf?sequence=1

66. Robinson, C. (2018). Making migration knowable and governable: Benchmarking practices as technologies of global migration governance. *International Political Sociology, 12*(2), 113–129. https://doi.org/10.1093/ips/oly020

67. Robinson, C. (2020). Measuring 'well-governed' migration: The IOM's migration governance indicators. In T. Bastia & R. Skeldon (Eds.), *Routledge Handbook of Migration and Development* (pp. 63–74). Routledge. https://link-springer-com.kuleuven.e-bronnen.be/chapter/10.1007/978-3-030-32976-1_6

68. Rodríguez, H. (2017). Los seres humanos emigraron desde África hace 60.000 años debido a un cambio brusco del clima. *National Geographic España*. https://www.nationalgeographic.com.es/ciencia/actualidad/los-seres-humanos-emigraron-desde-africa-hace-60000-anos-debido-cambio-brusco-del-clima_11968

69. Ruschemeier, H., & Hondrich, L. (2024, February 23). *Automation Bias in Public Administration - an Interdisciplinary Perspective From Law and Psychology*. SSRN Electronic Journal. https://papers.ssrn.com/sol3/papers.cfm?abstract_id=4736646

70. Samber, S. (2018). *New software does the hard work in placing refugees*. HIAS. https://www.hias.org/news/new-software-does-the-hard-work-in-placing-refugees/

71. Schäfer, M., Franzke, A., & Muis, I. (2022). *The Data Ethics Decision Aid (DEDA): A practical tool for data projects in public organizations*. Utrecht University. https://deda.dataschool.nl/en/

72. Soley, L. C., & Smith, A. L. (2008). *Projective techniques for social science and business research*. The Southshore Press. https://epublications.marquette.edu/marq_fac-book/278/

73. Stebbins, R. A. (2001). Exploratory research in the social sciences. SAGE Publications, Inc., https://doi.org/10.4135/9781412984249

74. Stielike, L. (2022). *Migration multiple? Big data, knowledge practices and the governability of migration.* Springer. https://library.oapen.org/bitstream/handle/20.500.12657/51964/978-3-030-81226-3.pdf?sequence=1

75. Triandafyllidou, A. (2020). Decentering the study of migration governance: A radical view. *Geopolitics*, *25*(1), 214–234. https://doi.org/10.1080/14650045.2020.1839052

76. United Nations High Commissioner for Refugees. (n.d.). *Asylum seekers*. Retrieved May 9, 2025, from https://www.unhcr.org/europe/about-unhcr/who-we-protect/asylum-seekers

77. United Nations High Commissioner for Refugees. (2024). *Global trends: Forced displacement in 2023*. United Nations High Commissioner for Refugees.

78. Vallance, B. C. (2022, December 7). *ChatGPT: New AI chatbot has everyone talking to it*. https://www.bbc.com/news/technology-63861322

79. Van Der Boor, C. F., Amos, R., Nevitt, S., Dowrick, C., & White, R. G. (2020). Systematic review of factors associated with quality of life of asylum seekers and refugees in high-income countries. *Conflict and Health*, *14*(1). https://doi.org/10.1186/s13031-020-00292-y

80. Vohra, A. (2023). *Social order in the age of artificial intelligence: The use of technology in migration governance and decision-making* [Master's thesis, University of British Columbia]. UBC cIRcle. https://open.library.ubc.ca/soa/cIRcle/collections/ubctheses/24/items/1.0437225

81. Wickens, C. D., Goh, J., Helleberg, J., Horrey, W. J., & Talleur, D. A. (2015). Complacency and automation bias in the use of imperfect automation. *Human Factors: The Journal of the Human Factors and Ergonomics Society*, *57*(5), 728–739. https://doi.org/10.1177/0018720815581940

82. Yin, R.K. (2014). Case Study Research Design and Methods (5th ed.). *Canadian Journal of Program Evaluation*, *30*(1), 108–110. https://doi.org/10.3138/cjpe.30.1.108

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(in a separate document as requested by the KU Loket submission page)