European Commission

European Migration Network

THE USE OF DIGITALISATION AND ARTIFICIAL INTELLIGENCE IN MIGRATION MANAGEMENT

EMN-OECD INFORM

February 2022

1. INTRODUCTION

This joint EMN-OECD inform is the second of the 2021 series of informs on Innovation in Migration. In view of the dynamic nature of the migration policy landscape and in the context of the new Pact on Migration and Asylum[1], this series explores existing trends, innovative methods and approaches in migration management and will be used as a basis for further policy reflection at EU level. This inform builds on trends identified in the EMN-OECD series on migration management informs on COVID-19 in the migration area.[2] Its scope includes EU Member States[3], EMN observer countries[4] as well as OECD countries.

This inform aims to explore the role of new digital technologies in the management of migration and asylum. It focuses on a number of specific areas in migration, acquisition of citizenship, asylum procedures and border control management where digital technologies may be used (e.g. digitalisation of application processes, use of video conferencing for remote interviews, use of artificial intelligence (AI) to assist decision making processes, use of blockchain technology). It also considers the implications of using these types of technologies on fundamental rights.

This inform was prepared on the basis of inputs from 24 EMN National Contact Points and complemented with inputs from the OECD covering developments in non-EU OECD countries. Additional details on Member States' approaches were also obtained through complementary sources.

What is digitalisation?

Digitalisation is the use of digital technologies to change a business model and provide new revenue and value-producing opportunities; it is the process of moving to a digital business.[5]

What is blockchain?

Blockchain technology is a structure that stores the public's transactional records, also known as the "block", in several databases, known as the "chain," in a network connected through peer-to-peer nodes. Typically, this storage is referred to as a "digital ledger". Every transaction in this ledger is authorised by the digital signature of the owner, which authenticates the transaction and safeguards it from tampering, which means that the information that the digital ledger contains is highly secure. The data can be shared with anyone, but it cannot be altered.[6]

1 Communication on a New Pact on Migration and Asylum, COM(2020) 609 final https://ec.europa.eu/info/strategy/priorities-2019-2024/promoting-our-european-way-life/new-pact-migration-and-asylum_en, last accessed 26/01/2022.

2 EMN and OECD, 2020, 'Inform on EU and OECD Member States responses to managing residence permits and migrant unemployment during the COVID-19 pandemic', https://ec.europa.eu/migrant-integration/library-document/inform-1-eu-and-oecd-member-states-responses-managing-residence-permits-and_en, last accessed 26/01/2022; and EMN and OECD, 2021, 'Umbrella inform on the impact of COVID-19 in the migration area in EU and OECD countries', https://ec.europa.eu/migrant-integration/library-document/umbrella-inform-impact-covid-19-migration-area-eu-and-oecd-countries_en, last accessed 26/01/2022.

3 Contributions from 24 EMN National Contact Points (NCPs) have been received, namely Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Estonia, Finland, France, Germany, Hungary, Ireland, Italy, Latvia, Lithuania, Luxembourg, the Netherlands, Poland, Portugal, Slovak Republic, Slovenia, Spain, Sweden, Georgia.

4 The contribution of Georgia has been included in this inform.

5 For more information please see: https://www.gartner.com/en/information-technology/glossary/digitalization, last accessed 24/01/2022.

6 For more information please see: https://www.simplilearn.com/tutorials/blockchain-tutorial/blockchain-technology, last accessed 04/02/2022.

DG Migration & Home Affairs

EMN European Migration Network

OECD BETTER POLICIES FOR BETTER LIVES

What is artificial intelligence (AI)?

AI refers to systems that display intelligent behaviour by analysing their environment and taking actions – with some degree of autonomy – to achieve specific goals.[7]

Looking into the future: Forecasting migration flows

This inform includes examples of how some countries are looking into using AI and digital tools for forecasting migration flows and trends, but at this stage does not explore the issue further, since the EMN is planning to examine the theme of AI for forecasting migration flows in a dedicated publication.

2. KEY POINTS TO NOTE

- EU Member States, non-EU OECD countries and Georgia have increased their use of digital technology in the migration and asylum areas in recent years. This greater focus on digital technology is set against the backdrop of significant challenges, including fluctuating and increasing migration flows and the COVID-19 pandemic. The pandemic increased the use of digital technologies as immigration and asylum authorities extended their online services in some EU Member States. The technologies used in EU Member States and Georgia vary from online appointment systems and customer service portals for lodging and tracking application, to the use of AI for different functions, and blockchain technology.
- Most EU Member States and Georgia make use of online systems to support application processes for residence permits and citizenship. Such systems are mostly used to allow applicants to make an appointment online with relevant authorities. Nearly half of EU Member States and Georgia offer more sophisticated digital services, such as lodging online applications and tracking progress remotely. Overall, more countries use digital systems to manage residence permit applications than citizenship applications.
- Three EU Member States currently use blockchain technology for migration management, to enable secure exchanges of highly sensitive information, to connect different services and systems, and to improve information flows between different authorities involved in migration management.
- Six EU Member States and most non-EU OECD countries currently use AI for migration management, including for language identification and assessment; for detecting identity document fraud; for case management; and for interacting with clients. In addition, 10 EU Member States and Georgia are implementing pilot projects, or planning initiatives to use AI for, *inter alia*, chatbots, migration forecasting and tracing document fraud.
- The increased use of digital technology raises particular fundamental rights challenges, specifically in relation to the protection of personal data. All EU Member States are bound by the General Data Protection Regulation (GDPR) and the Charter of Fundamental Rights of the European Union. Some EU Member States reported carrying out Data Protection Impact Assessments (DPIA) to ensure compliance with data protection principles.
- The analysis and examples provided in this inform suggest that the EU Member States, Georgia and non-EU OECD countries are at different stages of their respective digitalisation, blockchain and artificial intelligence journeys. While some non-EU OECD countries are more advanced in the digitalisation of their migration management systems than EU Member States, the situation is more mixed in other non-EU OECD countries.

3. CONTEXT AND RATIONALE

Migration is a significant and growing phenomenon in the EU and other OECD countries. Between 2011 and 2019[8], the number of first residence permits issued to non-EU nationals by EU Member States rose from roughly 1.5 million in 2011 to almost 3 million in 2019.[9] Over the same period, the number of persons applying for international protection also increased in the EU from 282 000 in 2011 to 675 000 in 2019, with a peak of nearly 1.3 million in 2015.[10] The trend is similar in non-EU OECD countries, which witnessed increasing immigration flows until the COVID-19 pandemic.[11] For EU Member States, growing (forced) migration flows and shifting patterns have posed new challenges, such as dealing with administrative backlogs, managing large databases and registries whilst ensuring their interoperability, and making the best use of big data, but also detecting identity document fraud, as well as security threats.[12]

The use of digital technologies has been growing substantially over the last 40 years in Europe and beyond. It is

7 European Commission, 'Shaping Europe's Digital Future', 8 March 2021, https://ec.europa.eu/info/strategy/priorities-2019-2024/europe-fit-digital-age/shaping-europe-digital-future_en, last accessed 24/01/2022.

8 Data for 2020 is not being presented as it shows a trend break due to the COVID-19 pandemic.

9 First permits by reason, length of validity and citizenship (MIGR_RESFIRST), Eurostat, extracted 20/07/2021.

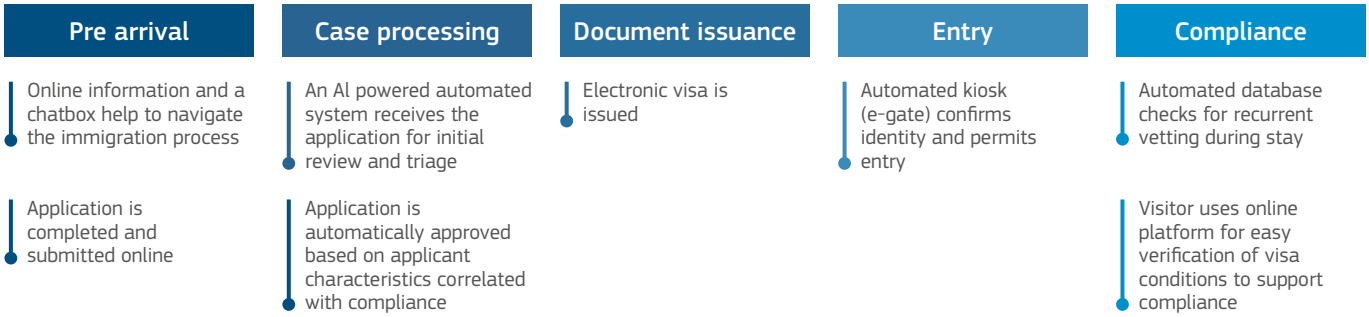
10 Asylum applicants by type of applicant, citizenship, age and sex (MIGR_ASYAPPCTZA), Eurostat, extracted 20/07/2021.

11 OECD (2021) International Migration Outlook. https://www.oecd.org/migration/international-migration-outlook-1999124x.htm, last accessed 24/01/ 2022.

12 See EMN, 'Accurate, timely, interoperable? Data management in the asylum procedure', 2021 pp.31-33 https://emn.ie/publications/accurate-timely-interoperable-data-management-in-the-asylum-procedure/, last accessed 24/01/ 2022.
See also EMN, 'Changing Influx of Asylum Seekers 2014-2018', 2018, p.34 https://ec.europa.eu/home-affairs/pages/page/changing-influx-asylum-seekers-2014-2016_en, last accessed 24/01/2022.
See also EMN 'Challenges and practices for establishing identity of third country nationals in migration procedures', 2017, pp.45-46 https://ec.europa.eu/home-affairs/whats-new/publications/challenges-and-practices-establishing-identity-third-country-nationals-migration-procedures_en, last accessed 01/02/2022.

increasingly used in every sphere of human life, including both the private sector and in public administration. Migration and asylum are no exception to this phenomenon. Investing in digitalising operations and processes can increase the efficiency of border, asylum and migration management.[13] Figure 1 below presents a non-exhaustive example of the different technologies that can be used for migration management.

Figure 1. Example of the use of technologies in migration management



In the asylum context, mostly in response to the high inflow of asylum seekers in Europe in 2015 and 2016, EU Member States have implemented IT systems not only to manage the asylum procedure, but also to provide reception services, such as information sharing, educational services and counselling, and integration services, for example, online cultural orientation and language courses, and education via MOOCs (Massive Online Open Courses).[14]

During the COVID-19 pandemic in 2020 and 2021, the use of digital technologies further increased as immigration and asylum authorities sought to continue their services online when on-site services were no longer possible or restricted, either by using and optimising pre-existing IT tools or by introducing new systems.[15] At the same time, the pandemic has raised the question of how to carry out identity controls without exposing law enforcement and immigration services staff to health risks. Contactless procedures and distance control can help prevent exposure, especially when conducting border controls at airports, or on trains or ships, which would allow border guards to do contactless ID controls from between four and six metres away. These new technologies are under development and will most probably change the way we will be travelling in the future.[16]

Moreover, the rapid digitalisation of migration and related services raises specific questions about accessibility in the context of persisting digital divides within and across countries, as well as regarding technological biases and personal data protection (See Sections 7 and 8 for further details).

4. USE OF ONLINE SYSTEMS AND DIGITAL TECHNOLOGIES FOR MANAGING RESIDENCE PERMIT AND CITIZENSHIP APPLICATIONS

Most EU Member States and Georgia, with the exception of Bulgaria and Slovenia, reported making use of online systems to process residence permits and citizenship applications, as shown in Table 1 below. Online appointment systems are the most common used. Nearly half of the EU Member States offer more sophisticated digital services, such as making online applications and tracking progress remotely. Overall, more EU Member States use online systems to manage residence permit applications than citizenship applications.

13 European Parliament, Digital Transformation (2019), https://www.europarl.europa.eu/RegData/etudes/BRIE/2019/633171/EPRS_BRI(2019)633171_EN.pdf, p.3, last accessed 24/01/ 2022.

14 EMN, 'Changing Influx of Asylum Seekers 2014-2018', 2018, pp. 22-24 https://ec.europa.eu/home-affairs/pages/page/changing-influx-asylum-seekers-2014-2016_en, last accessed 24/01/2022.

15 EMN / OECD, 'Umbrella inform on the impact of COVID-19 in the migration area in EU and OECD countries', 2021, https://ec.europa.eu/migrant-integration/library-document/umbrella-inform-impact-covid-19-migration-area-eu-and-oecd-countries_en, last accessed 24/01/ 2022.

16 ICMPD, 'How COVID-19 is changing border control', 2022, https://www.icmpd.org/news/how-covid-19-is-changing-border-control, last accessed 01/01/2022.

Table 1. Overview of Member States' use of online systems by type of application and task

Task	Residence permits	Citizenship
Making appointments	AT, CY, CZ, DE, EE, EL, ES, FI, FR, HR, HU, IE, LV, LT, LU, NL, PL, PT, SE, SK, GE	CY, DE**, EE, EL, ES, FI, FR***, LT, NL****, PT, GE
Lodging applications remotely	BE, EE*, EL, ES, FI, HR, HU, IE*, FR, LT, LV, NL, PL, PT, SE, GE	DE**, ES, FI, FR***, IT, LT, LV, PT, SE, GE
Tracking applications remotely	BE, CY, CZ, EE, EL, ES, FI, FR, HU, LT, NL, PT, SE**, GE	CY, DE**, EE, EL, ES, IT, LT, FR***, LT, NL, PT, SE, GE
Processing applications	AT, BE, CY, CZ, EE, EL, ES, HU, IE, FR, LT, NL, PT, SE, GE	AT, CY, CZ, DE**, EE, ES, FR***, IE, IT, LT, NL, PT, SE, GE

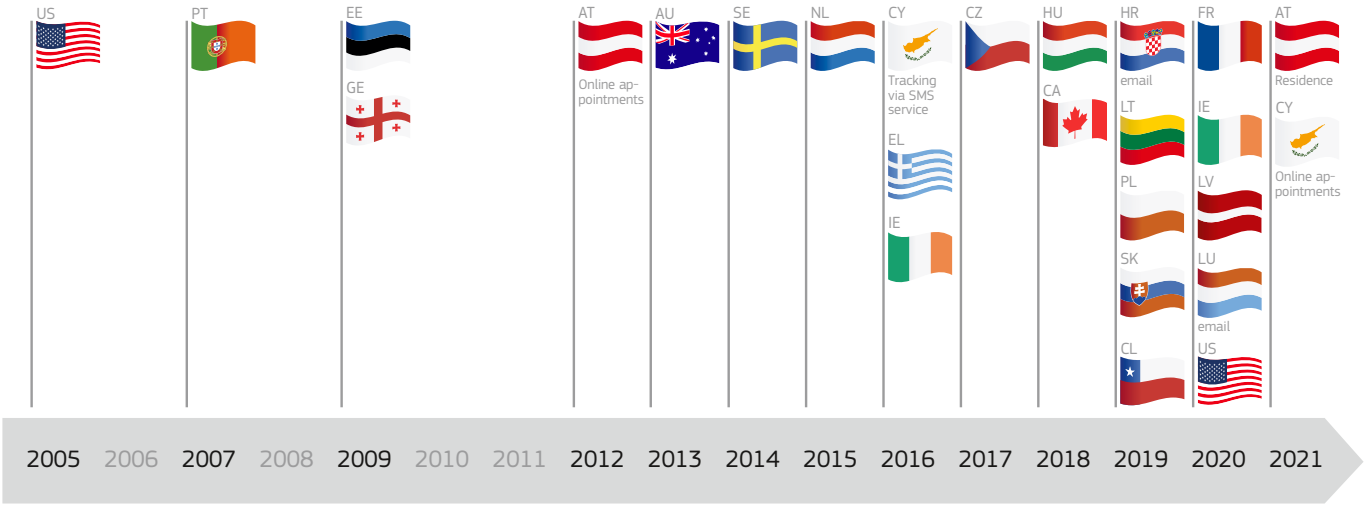
Please note that in some countries (e.g. Sweden), there are usually no appointments in relation to citizenship applications as the citizenship process is only in writing (paper or digital).
* Permit renewals only: EE, IE ** Partially *** Testing phase **** Only in some municipalities

The reasons most often cited by the responding EU Member States[17] and Georgia for using digital systems are related to enhancing the overall user experience and quality of services to third-country nationals, improving efficiency through better planning and paperless working, and saving time and resources.

Use of online systems for managing residence permit applications

Most EU Member States, other OECD countries and Georgia already make use of online systems and digital tools for managing residence permit applications. According to the information provided, such systems were introduced between 2007 and 2021, as shown in the timeline below. The COVID-19 pandemic was a catalyst for introducing such systems, in some cases.[18] Croatia and Luxembourg, for example, introduced appointments via email, while in Georgia to prevent the spread of COVID-19, a new working system was introduced where applicants can book appointments to access relevant services on premises[19].

Figure 2. Timeline of introducing online systems for managing residence permits



Overall, the timeline above shows an increasing trend in EU Member States digitalising and modernising their services and procedures, with some making their systems more extensive and sophisticated including plans for imminent developments. In Ireland, for example, a more modern online appointment system is planned to be in place by March 2022. In Germany, according to the Act to Improve Online Access to Administrative Services[20], the Federal Government, as well as all Federal States and municipalities, should offer their administrative services digitally via online administrative portals by 2022.

17 e.g. BE, FR, IE, NL, PT, SE.

18 See EMN / OECD, 'Umbrella inform on the impact of COVID-19 in the migration area in EU and OECD countries', 2021, https://ec.europa.eu/migrant-integration/library-document/umbrella-inform-impact-covid-19-migration-area-eu-and-oecd-countries_en, last accessed 24/01/ 2022 for additional information

19 For more information see https://www.my.gov.ge/en-us/services/10/visit-reservation/reservation/271, last accessed 24/01/ 2022.

20 The Act came into force in 2017.

Outside Europe, settlement countries such as Australia, Canada and New Zealand are well advanced in the digitalisation of their migration management systems. Other countries such as Chile have made progress recently and now process all visa and permit applications online without in-person interaction. The situation is more mixed in the United States and other non-EU OECD countries.

The United States demonstrates that digitalisation can sometimes be a lengthy and complex process. In 2005, the U.S. Citizenship and Immigration Service (USCIS) started to digitise its immigration system. However, progress in the initial years was both slow and costly. Since then, however, significant progress has been made. From 2019, business visitors, tourists and international students can apply online, and some applications for change or extension of status have been digitised.

In many ways the process of digitalisation of the immigration system in Chile was both quick and smooth, including the elimination of both paper forms and in-person appointments. The process started in 2018 with in-person appointments progressively being replaced by digital appointments. By February 2021, all appointments for residence permits became fully digitalised with clear cost and efficiency gains. In 2021, the regularisation programme was also done fully online and Chile moved to an e-visa with minimal personal interactions in consulates abroad.

Making appointments

In most EU Member States[21], digital systems are used for making appointments with competent authorities. In the Slovak Republic, for example, an online reservation system allows the applicant to register their application and to book appointments with relevant authorities through a PIN code. In Latvia, an online system is used for making appointments to provide biometric data and obtaining documents. In Estonia, the Police and Border Guard Board uses an online reservation system for booking appointments at its service points.

Lodging applications

In half of the reporting EU Member States and Georgia[22], digital systems are used for lodging applications remotely. However, in some EU Member States only certain categories of application are managed digitally. In Lithuania, only part of the process has been digitalised, as applicants submit their application and supporting documents through the Lithuanian Migration Information System (MIGRIS) but need to present the original documents in person at their appointment. In Estonia and Ireland, the use of digital systems is only for permit renewal, while the applicant is still required to submit their first application in person. In Croatia and Greece, online applications can be lodged only for specific types of permits. In Croatia, for example, a web application allows persons to apply for a temporary stay as digital nomads. In France, access to digital systems was introduced progressively for some categories: first for international students in November 2020, followed by the work permits and the "Talent Passport" residence permits respectively in April and May 2021. More recently, application processes related to residence permits for visitors, as well as residence permit duplicates and declarations for change of home address, were also digitalised. In the Netherlands, the online lodging of residence permit applications was introduced gradually for different categories of applications between 2015 and 2018.

Box 1. Lodging applications electronically in Georgia

Georgia's Distance Services Unit

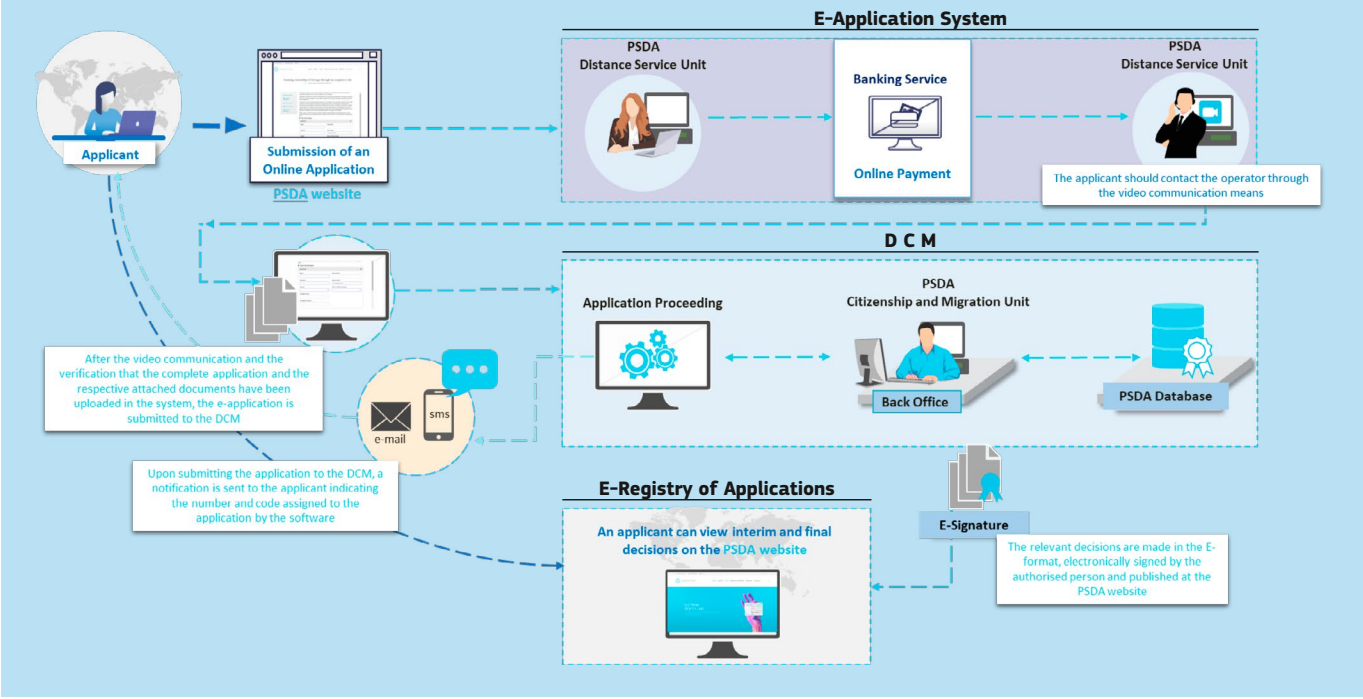
Georgia set up a 'Distance Services' Unit under the Public Service Development Agency (PSDA) using specially developed software to allow for the lodging of electronic applications for a residence permit and citizenship remotely. Applicants can complete and submit their applications online from any place worldwide, without having to visit any administrative office. In order to start the procedure, the applicant should connect online with the Distance Services Unit, via direct audio-visual electronic communication.

After the video communication and the verification that the application is complete and the respective attached documents have been uploaded in the electronic system, the e-application is submitted to the Citizenship and Migration Electronic Management System (DCM) to be processed. The main purpose for introducing the DCM system was to enhance e-governance, to save time and human resources of the relevant authorities, as well as to improve administrative procedures and the quality of customer service. Please see Figure 3 below.

21 AT, CY, CZ, DE, EE, EL ,ES, FI, FR, HR, HU, IE, LU, LV, NL, PL, PT, SE, SK, GE.

22 BE, EE*, EL, ES, FI, FR, HR, HU, IE*, LV, NL, PL, PT, SE, GE (*only for permit renewal). In Ireland, online permit renewal is for the Dublin area only. Face-to-face appointments are carried out by the Garda National Immigration Bureau for renewals outside Dublin; however there are plans to move this online during 2022.

Figure 3. E-administration of the residence permit and citizenship applications in Georgia



Tracking applications

In some EU Member States and Georgia[23], digital systems allow applicants to track the status of their applications online. In the Czech Republic and France, for example, the application tracking system allows applicants to monitor at which stage of the process their application is and to access other relevant information. In Cyprus, applicants can monitor progress on their application via an SMS-Service. In Belgium, applicants who submitted a visa application receive a receipt with a unique 5-digit number. This number allows an applicant to follow the status of their file on the Belgian Immigration Office's website. In the Netherlands, applicants can log into My IND (*Mijn IND)* with the use of their Digital Identity (DigiD) that is used across government services and is available for all persons in the Netherlands with a citizen service number. In Sweden, the tracking system for certain types of applications can also be used by applicants and case-workers to send messages to each other. Ireland is currently working on a proof of concept with a view to introducing a tracking system in 2022.

Processing applications

Some EU Member States and Georgia have also digitalised the processing of applications.[24]

In the Czech Republic, the Ministry of the Interior uses a system (managed by the Police) which allows the migration authority to check and manage the processing of applications of certain clients. It also enables the migration authority to conduct basic security checks. In Lithuania, the MIGRIS system is able to send requests for additional documents or other information to applicants. MIGRIS can also retrieve information from other state registries and information systems. Furthermore, any decisions regarding applications are made and sent to applicants via MIGRIS. In France, the HIPE programme (Harmonisation and Innovation in the Pathway of Foreign nationals) has allowed the development of a web portal for users to gain access to both general information on procedures and personalised information on the progress of the user's file in the current procedure.

In the Netherlands, applications are automatically processed in the backend system of the IND, resulting in a registered case file. Follow-up actions are needed to resolve the case. The IND is currently running a pilot project where these follow-up actions are carried out through automated processing in the so-called treatment machine (*behandelautomaat*), leading to a suggestion which supports the case worker in deciding on the application. The final decision is communicated to the applicant both digitally and in writing.

23 BE, CY CZ, EE, EL, ES, FI, FR, HU, LT, NL, PT, GE.

24 AT, BE, CY, CZ, EE, EL, ES, FR, HU, IE (renewals in Dublin area), LT, NL, PT, SE, GE.

Box 2. Online visa applications

In most non-EU OECD countries including Australia, Canada, Chile, New Zealand, Turkey and the United Kingdom, as well as in many non-OECD countries (e.g. India, Kenya, Russia, Singapore), online e-visa applications are the norm. In most cases, an AI process conducts an initial triage between standard and at-risk applications, flagging the latter for review by an immigration officer. In some countries, such as Canada, the process focuses on specific countries of origin with large volumes of applications (e.g. China and India).

In Australia, online visa applications are made through ImmiAccount - an online platform for creating, submitting and managing visa applications. The platform allows visa applicants (and holders) to track and modify their visa application, update personal information, and check the details of their visa. Over 12 million ImmiAccounts have been created since the platform was launched in 2013. Australia also has a Visa Entitlement Verification Online (VEVO) system, which allows visa holders, employers, education providers and other organisations to check visa conditions (e.g. work or study rights and visa validity).

Australia continues to encourage the uptake of online visa lodgement. In 2019/20, visa applications lodged online were prioritised in order to direct applicants to online channels, achieve faster outcomes and reduce levels of paper processing. Australia also introduced mandatory online lodgement of applications for Work and Holiday (subclass 462) visas (except for Chinese applicants). Improvements also continued to be made to automated correspondence to visa applicants and holders and the promotion of assisted online lodgement services through third-party providers to support clients using online channels.

Australia has also launched an ETA (Electronic Travel Authority) visa mobile app for selected nationalities[25].

Use of online systems for managing citizenship applications

Overall, EU Member States make less use of digital systems to manage and process citizenship applications.

In ten EU Member States and Georgia[26], digital systems are used for making appointments with competent authorities to lodge an application for citizenship. In Estonia, the Police and Border Guard Board have been using an online reservation system for booking appointments at its service points since 2012.

Lodging applications remotely is possible in nine Member States[27] and Georgia. Italy was the first country to introduce a web-based application in 2015.

14 EU Member States[28] and Georgia process citizenship applications using digital systems. The Czech Republic, for example, uses the GINIS information system of the Ministry of Interior for the electronic processing of citizenship applications. France is currently testing a new system[29], while in Germany, only some of the Länder have digitalised the processing of applications.

Tracking citizenship applications online is currently possible in 11 EU Member States and Georgia.[30] In Lithuania, for example, an information system for citizenship was introduced in 2020 for tracking the application status. In Spain, the entire procedure for processing Spanish nationality by residence is electronic.

Box 3. Greece: Integrated Information Citizenship System (Gr.I.I.C.S)

Since 2017, Greece's citizenship services use Gr.I.I.C.S to process citizenship applications. The system contains information on the organisational structure of the services, an overview of the legal requirements to obtain citizenship and all individual cases. It interoperates with other systems, such as the Criminal Records Database, the Police or the Migration System, to access relevant data for the examination of a case. It strictly follows the workflow of each category having equivalent steps and creates all necessary documents, from the interview invitation to the applicant, to the decision and the summary publication for the Government Gazette.
Please see Figure 4 below.

25 Brunei, Canada, Hong Kong, Japan, Malaysia, Singapore, South Korea, the United States of America

26 CY, DE (partially), EE, EL, ES, FI, FR (testing phase), LT, NL (partially), PT, GE.

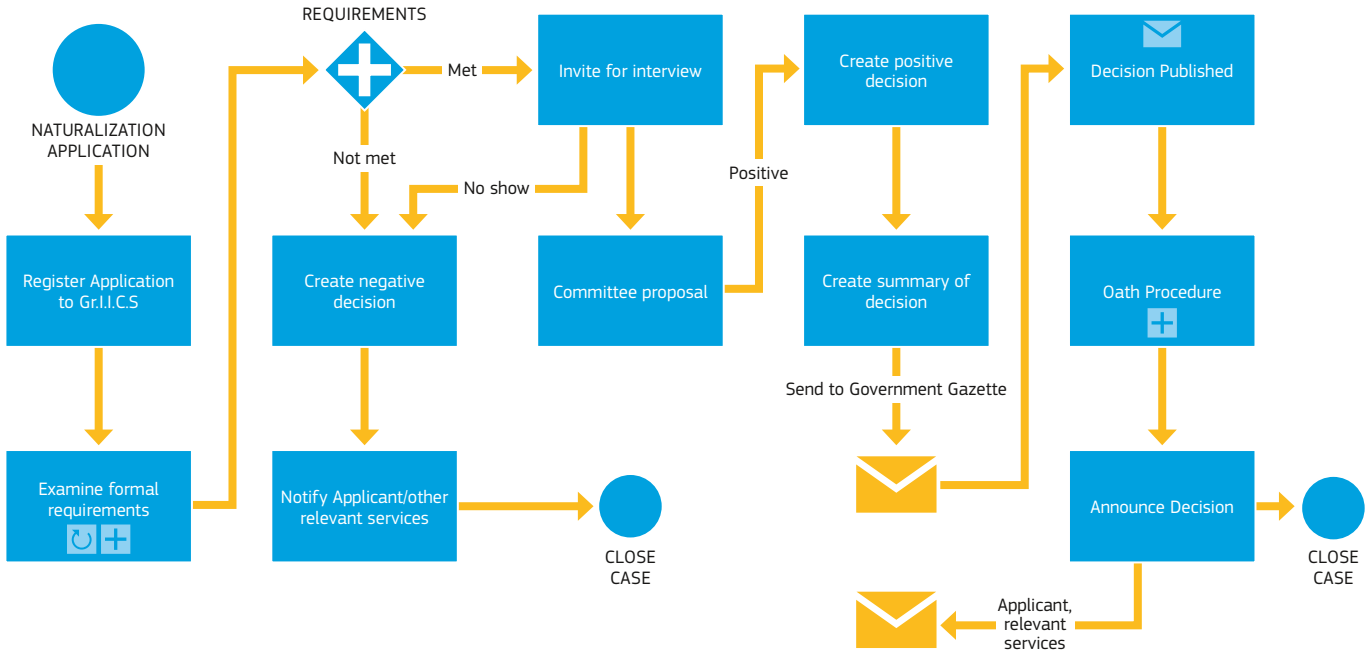
27 DE (partially), ES, FI, FR (testing phase), IT, LT, LV, PT, SE, GE.

28 AT, CY, CZ, DE (partially), EE, EL, ES, FR (testing phase), IE, IT, LT, NL, PT, SE, GE.

29 In France, a pilot project has been launched in 31 departments in August 2021 on 7 platforms for applying for nationality by decree. The pilot will be progressively extended to the entire territory throughout 2022.

30 CY, DE (partially), EE, EL, ES, IT, FR (testing phase), LT, NL, PT, SE, GE.

Figure 4. Workflow of Gr.I.I.C.S



Outside Europe, Australia, Canada, New Zealand and the United States have digitalised most of their citizenship application processes. In Australia, for example, in the fiscal year 2019-20, 83 % of 147 000 applications for citizenship were lodged online - compared to 77 % in 2018–19.

In the United States, naturalisation pre-processes have been digitalised and the 'myUSCIS' Portal allows individuals to file many more application forms online and to track application statuses and correspondence. Currently, 40% of filings are handled exclusively through digital processing, and an additional 20% are handled using a hybrid model. USCIS currently plans to establish electronic filing procedures for all immigration forms and implement a system for two-way communications with its customers until 2026.

5. BLOCKCHAIN

Three EU Member States[31] currently use blockchain technology for migration management. In these Member States, blockchain technology is used to enable exchanges of highly sensitive information, to connect different services and systems, and to improve information flows between authorities involved in migration management.

Estonia operates a country-wide e-services ecosystem for e-governance (the majority of public services are available online) and e-identity (a digital identity is issued to every Estonian citizen and e-resident for identification and use of e-services). Blockchain technology, referred to as Keyless Signature Infrastructure, is used to ensure that all related networks, systems, and data (e.g. national health, judicial, legislative, security and commercial code systems) are secure. For migration management in particular, blockchain technology enables the interoperability of services, allowing relevant authorities to exchange information confidentially and in an integral manner, and enabling the relevant public and private sector e-service information systems to link up and function together through an application called X-road.

In Germany, the Federal Office for Migration and Refugees (BAMF) is piloting a blockchain infrastructure called FLORA, to manage national protection and Dublin procedures, and to demonstrate that a blockchain solution could offer the functionality required to coordinate the workflow underlying the German asylum procedure. Since April 2021, FLORA is being piloted in real operations at the Centre for Arrival, Decision and Return (AnkER) facility in Dresden. It supports coordination and exchange of process data across organisational workflows. FLORA does not replace any existing systems but is rather intended as a supplementary connecting system to improve information flows between the authorities involved. The evaluation of the pilot shows that the FLORA system delivers significant added value in terms of reducing the susceptibility to errors, transparency of process-relevant information, and simplification of manual effort.

The use of blockchain technology is planned as part of a project to coordinate and manage Dublin-transfer cases. The project, led by Germany, is part of the European Blockchain Services Infrastructure initiative (EBSI) and is expected to be rolled out in other Member States in the future. For first conceptualisation and evaluation of a proof-of-concept it is set to be prototyped between France (Directorate of asylum, Department of access to the asylum procedure) and Germany (BAMF, Dublin unit).

In France, the project involves cooperation between the ANEF portal[32] (Digital Administration for Foreign Nationals in France) and the Asylum Department of the Ministry of the Interior.

31 DE, EE, PT. Finland also did a small D-ID experiment in 2016 during the refugee crisis.

32 *L'Administration Numérique pour les Etrangers en France*

In Lithuania, as part of the D4FLY (Detecting Document Fraud and Identity on the Fly) Horizon 2020 project, the State Border Guard Service participated in a field test to evaluate solutions for land border checks, which was also testing blockchain technology in August 2021. D4FLY explored using blockchain technology as a solution that could enable border guards to review document verification history and see where and how often the document has already been checked previously.[33]

6. ARTIFICIAL INTELLIGENCE

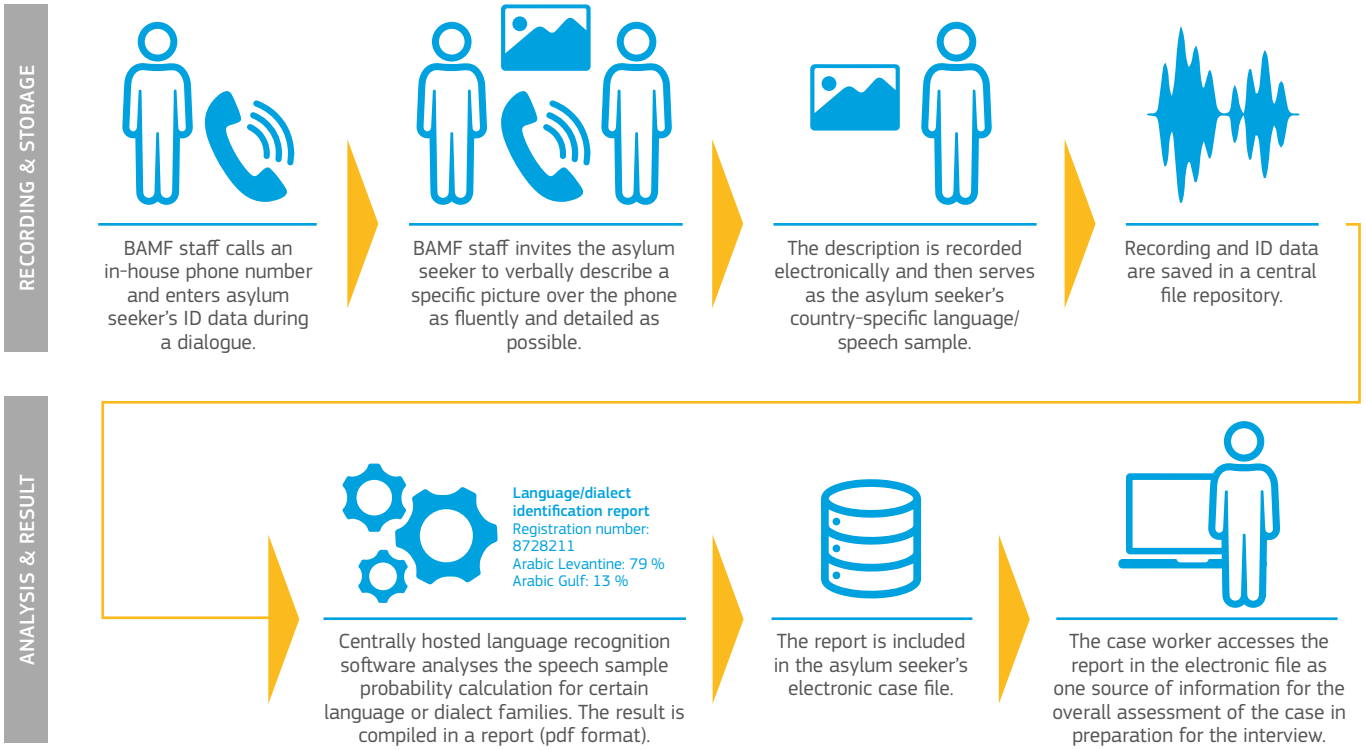
Current USE OF ARTIFICIAL INTELLIGENCE

Six Member States[34] confirmed the use of AI for the purpose of language identification and assessment[35]; for identity fraud detection purposes[36]; for case management;[37] and for interacting with clients[38].

Language identification and assessment

In Germany, BAMF uses an AI tool (The Language and dialect identification assistance system, or DIAS) in the asylum procedure which can recognise Arabic dialects to receive indications on the country of origin, the functioning and workflow of which are shown in the box below. The BAMF considers that the AI tool enhances efficiency especially when dealing with a high influx of asylum applicants, many of whom lack identity documents.

Figure 5. The DIAS workflow



In Latvia, an AI-based automatic speech recognition tool is being used in the citizenship procedure to verify knowledge and language proficiency. One part of the citizenship test requires applicants to perform Latvia's national anthem either in written form or, using the tool, vocally.

33 For more information, please see: https://www.bpti.eu/naujienos/innovative-technologies-for-identity-and-document-verification-were-tested-at-the-lithuanian-border, last accessed 01/02/2022.
34 DE, FI, HU, LV, LT (testing), NL.
35 DE, LV.
36 HU, LV, LT (testing), NL.
37 FI.
38 FI, LV.

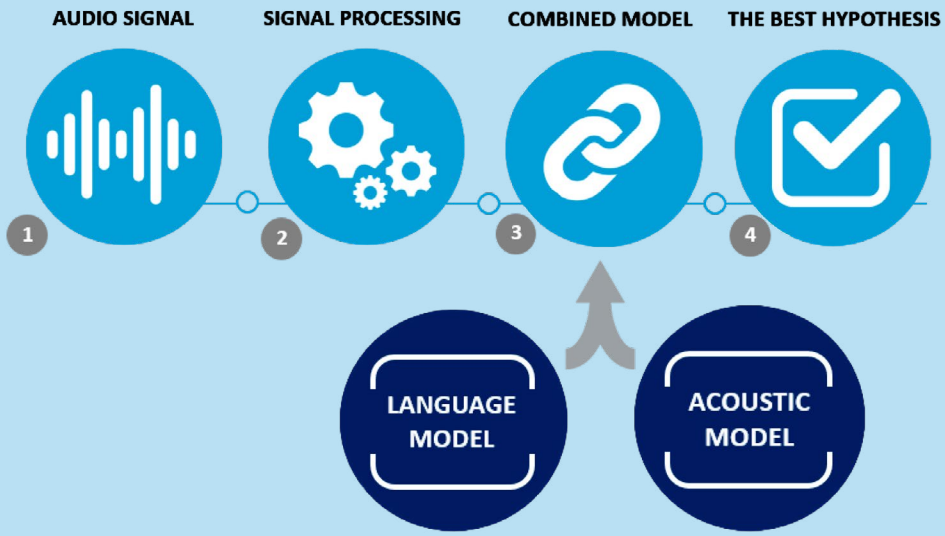
Box 6. Latvia: the Tilde Speech Recognition System

The Tilde Speech Recognition System transforms spoken Latvian from a pre-recorded audio/video file into text. The system is developed or trained by focusing on its most essential components: speech and acoustic models. The acoustic model transforms the audio signal into graphic signs, while the speech model creates words and sentences, making sure that the sentences are reliable from a language point of view in the specific area. The acoustic model is trained with various audio recordings that reflect the acoustic parameters of the audio files that are recognised later. A significant number of audio recordings (5 000 to 10 000 hours) is required to achieve a good result. Specific industry texts, terminology, dictionaries, etc. are used to train the speech model. To comprehensively develop this algorithm, text files containing at least 10-20 million words are required.

The Office of Citizenship and Migration Affairs' (OCMA) solution is adapted depending on customer needs and specific uses on the training platform for the naturalisation examination of the Republic of Latvia. The recognition system for the national anthem was 'trained' with recordings of the national anthem, to improve recognition of the verses of the anthem. A data collection campaign was carried out to customise the speech solution; during the campaign, audio samples recorded by respondents of various nationalities were acquired that allowed the solution to adapt to speakers with varied voice samples, dialects, speech patterns and nationalities. In developing the Speech Recognition System, it was important that the specific pronunciation of the Latvian language by people of various nationalities could be recognised. In total, more than 1 200 voice samples were used for training purposes.

Currently, this speech solution recognises the anthem in real time. Thus the user can also obtain their results almost in real-time.

Figure 6. Conceptual Diagram of the Speech Recognition Technology



Identity fraud detection

In the Netherlands, the Immigration and Naturalisation Service (IND) uses algorithms to support examination and detection of document fraud related to breeder documents[39] within their procedures. Germany, the United States, Australia and Canada also use AI to confirm identity based on biometric data and to better detect fraudulent documents.

In Finland, the pilot project TIKKA seeks to confirm the identity of applicants through a combination of open-source data, artificial intelligence and human analysis.

Hungary and Lithuania use AI for facial recognition. In Hungary, the Aliens Policing Authority uses facial recognition to establish the identity of foreign nationals and to prevent fraud.

In Lithuania, in August 2021, the State Border Guard Service participated in a field test to evaluate solutions for land border checks. The verification and detection technologies developed by the project include automated 3D facial and iris verification technologies.

The EU-financed 'iBorderCrtl' project, currently being tested in Greece, Hungary and Latvia, includes one AI-powered module where an avatar asks passengers a series of filtered questions at the border crossing.

National authorities need to remain alert to identify and counter new methods of identity fraud, as illustrated in Box 5.

39 Breeder documents are defined as documents used to support applications for identity, residence and travel documents, such as birth, marriage and death certificates: https://ec.europa.eu/home-affairs/pages/glossary/breeder-documents_en; last accessed 25/01/2022.

Box 7. Morphing: a new challenge for facial recognition

As border and other controls increasingly rely on contactless control, new tools have been adopted, such as using AI for facial recognition. At the same time, the risks of fraud in this area have increased as well. Untrustworthy face images, created through a 'morphing' attack, are used by criminals or other persons wishing to hide their real identity to pass borders unnoticed. Morphing attacks most often involve blending the face images of two individuals, so that the "morphed" image can be used for the verification of both persons involved. In general, the scenario followed is that the criminal who wishes to pass the border without being stopped, morphs their face image with that of a lookalike accomplice, who does not have a criminal record. The latter applies for an electronic Machine Readable Travel Document (eMRTD), providing the morphed image as their own, which, if not detected, leads to a valid travel document being issued that can be used to travel and may go unnoticed, even when AI facial recognition is applied as part of border checks or security controls. Research has shown that humans too are unable to effectively detect morphed images and that trained passport officers perform no better than untrained university students when dealing with unfamiliar faces. The challenge is such that several countries are looking into possible legislative changes, as well as into technologies to detect morphing attacks.[40]

Case management

During 2015-2016, Finland used a real-time "flow throughput estimator" in its case management system, which could, using a variety of algorithms, predict migration flow bottlenecks, assessing the complexity of each individual case and the estimated cost price of each individual case as it enters the system.

Interacting with clients

An AI-based 'chatbot' virtual assistant (VA) is used in Latvia on the homepage of the Office of Citizenship and Migration Affairs, to inform customers about its functions and services. Customers are being served more efficiently because the VA can respond more quickly, while communicating with many customers at the same time. In Ireland, an AI-based chatbot is currently being piloted to inform potential use of AI. This VA is used to answer customer queries on the citizenship page of the Immigration Service Delivery website. The VA provides general citizenship information, it does not provide application-specific updates.

Finland uses a chatbot VA called Kamu, which has replaced 'human' customer services and has, to date, managed over 1 million conversations. Usage of this particular AI feature has allowed the migration authorities to serve a much higher number of customers (simultaneously), thus reducing the burden on human staff.

Outside the EU, chatbots to respond to online migration questions have been developed with success: for example, in Chile (handling more than 10 000 requests per day), in Australia (more than 200 000 requests in the first year of implementation in 2019-20) and in Canada.

FUTURE PLANS TO USE AI

Ten EU Member States[41] and Georgia reported on specific pilot projects and planned initiatives using AI for, *inter alia*, chatbots, migration forecasting, and tracing documentary fraud. Specific pilot projects and upcoming initiatives were reported as follows:

- A number of Horizon 2020 projects have explored AI-based solutions for migration management. For example, the Horizon 2020-funded project "Starlight" brings together over 50 organisations across 11 Member States, and aims to develop AI-based solutions in a number of areas, including migration management.[42] The "Nadine" project, with partners in seven Member States, aims to harness the potential of big data and AI to support migrant integration across Europe[43], whilst similarly, the "easyRights" project focuses on facilitating migrant integration through, *inter alia*, tools enabling the creation of personalised service experiences, using voice recognition and Natural Language Processing tools.[44]
- In Belgium, the Immigration Office is participating in a joint framework on verification of breeder and supporting documentation with the aim of developing a research tool that can automatically detect, match, and validate breeder documents to support the operational research process.
- France plans to use AI to trace document fraud in the ANEF portal (digital administration for foreign nationals in France). The setup is currently in progress and the objective is to allow administrations and services to have direct access to information relating to document fraud.
- In Germany, BAMF is conducting a feasibility study to assess existing approaches for the use of AI instruments for migration forecasting. The future tool is expected to support decision-making and assist with the assessment of irregular migration flows from specific countries of origin or transit towards the EU and Germany. Furthermore, a prototype model has been developed by the Federal Foreign Office to predict the number of internally displaced persons (IDP) globally. The model is part of a case study to deliver a proof of concept and as such, it has never served as a decision-making instrument.
- In Ireland, as part of a new centralised customer service unit planned for 2022, the greater use of AI is under consideration. This may involve data mining and use of

40 Pikoulis, E.-V.; Ioannou,Z.-M.; Paschou, M.; Sakkopoulos, E. Face Morphing, a Modern Threat to Border Security: Recent Advances and Open Challenges. Appl. Sci. 2021, 11, 3207. https://doi.org/10.3390/app11073207; last accessed 01/02/2021.

41 BE, DE, ES, FR, HU, IE, LV, LT, NL, SE, GE

42 More information at: https://cordis.europa.eu/project/id/101021797, last accessed 01/02/2021.

43 More information at: https://nadine-project.eu, last accessed 01/02/2021.

44 More information at: https://www.easyrights.eu, last accessed 01/02/2021.

AI and machine learning with language capability (e.g. chatbots, Interactive Voice Response) to handle customer queries.

- In France and Ireland, future plans concern the introduction of chatbots. In France, the Ministry of the Interior plans to implement chatbots during the first semester of 2022 on the portal relating to applications for access to nationality (called NATALI). The Paris Police Prefecture also implemented in December 2021 a chatbot called Lepine on its website to answer 24 hours /7 days to foreign nationals.
- Hungary is planning the use of a speech recognition system to establish identity.
- Latvia and Lithuania have reported on future plans to carry out migration forecasting. In Lithuania, the Ministry of Interior is looking into possibilities of participating in migration forecasting projects.
- In the Netherlands, the Immigration, Identification and Human Trafficking Department (AVIM) of the National Police is currently exploring whether the system 'Data Excellence Management System' (DEMS) can be used for identification of migrants. The artificial intelligence and data governance used in DEMS is intended to help AVIM employees make the right process steps and decision in their natural language. Furthermore, the IND's language analysis department is participating in a pilot project which includes AI, led by Germany and supported by the European Union Agency for Asylum - EUAA (formerly EASO).
- Spain is currently analysing the possibility to use AI for the analysis of labour market needs and migratory flows.
- In Sweden, the Swedish Migration Agency is undergoing a long-term digital transformation, which may influence the operational aspects of forecasting in the future. Sweden is not presently using AI to conduct migration forecasting and the methods used are based on qualitative analyses on developments in countries and regions of origin, migration routes, distribution of different migrant nationalities within Europe, policy developments on EU and national level – combined with European and national migration data.
- In Georgia, with support of the EU, the PSDA has been developing a Unified Migration Data Analytical System (UMAS) since 2014. The system integrates migration-related administrative data accumulated in different state agencies into one space, and analyses the data to facilitate decision-making in migration management. In parallel with traditional forecasting methods (which use approaches based on averages, time series, etc.), the use of AI is planned to create predictive models by introducing (supervised and unsupervised) machine learning. This AI-based tool will be managing most migration-related administrative data (residence permits, citizenship, asylum, etc.) dispersed in different places in one space.

DG HOME recently procured a study to assess the feasibility of developing a forecasting and early warning tool based on AI technology, which is capable of forecasting and assessing the direction and intensity of irregular migratory flows to and within the EU, and to provide early warnings and forecasts on this basis both in the short term (1 to 4 weeks) and in the medium term (1 to 3 months). The study concluded that the development of such a tool would overall be feasible and set out the recommended steps to be taken, including the creation of a legislative framework which included fundamental rights considerations, in line with the EU's Ethics Guidelines on Trustworthy AI.[45]

7. FUNDAMENTAL RIGHTS CONSIDERATIONS, INCLUDING DATA PROTECTION

Fundamental rights, such as the right to private and family life (Article 7) and protection of personal data (Article 8), are guaranteed by the Charter of Fundamental Rights of the European Union[46].

Member States and all organisations engaged in a professional or commercial activity that process or store personal information about EU citizens or EU residents must comply with the General Data Protection Regulation (GDPR Regulation (EU) 2016/679)[47] and any corresponding national legislation when processing personal data. Personal data must be processed lawfully, fairly and transparently; be collected for specified, explicit and legitimate purposes; be adequate, relevant and limited to what is necessary for the processing; be accurate and where necessary kept up to date; be kept in an identifiable form for no longer than is necessary for the purpose for which it is provided; and be kept secure. Article 6 of the GDPR sets out the legal bases for the lawful processing of personal data. The data subject must be aware of the purpose of the processing of the data concerned and the legal basis for it. The data subject must be informed of their rights in relation to data protection, including rights of access, rectification and erasure. This implies, in the case of the digital systems and tools described above, that these can only be accessed by organisations and staff who are specifically authorised to access and process the data for the fulfilment of their work tasks, arising from the law.

The EU Agency for Fundamental Rights (FRA), in its 2020 report on artificial intelligence and fundamental rights,[48] identifies several fundamental rights in addition to data protection and privacy which may be affected by the use of AI, such as human dignity (Art. 1), equality and

45 Feasibility study on a forecasting and early warning tool for migration based on Artificial Intelligence technology, November 2020, European Commission. More information at: https://op.europa.eu/en/publication-detail/-/publication/5afa29f0-700a-11eb-9ac9-01aa75ed71a1; last accessed 03/02/2022.

46 Charter of Fundamental Rights of the European Union, 2012, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012P%2FTXT; last accessed 03/02/2022.

47 Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A02016R0679-20160504&qid=1532348683434; last accessed 03/02/2022.

48 Getting the future right – Artificial Intelligence and fundamental rights. FRA, 2020; https://fra.europa.eu/en/publication/2020/artificial-intelligence-and-fundamental-rights, last accessed 01/02/2022

non-discrimination (Art. 20 and 21), access to justice (Art. 47) and the right to good administration (Art. 41). For example, the report discusses the risk that automated decision-making by public authorities, also as part of migration procedures, may breach rights in relation to good administration and due process. A key problem relates to bias, which, often unconsciously, can be introduced in the algorithms that are developed and which in turn may lead to unequal treatment[49].

A few Member States, such as Austria, Belgium[50] and France, referred to carrying out Data Protection Impact Assessments (DPIA) which is a process that helps identify and minimise data protection risks[51]. In France, users of the ANEF[52] portal have certain access rights and can request the administration to grant them the right to be forgotten[53]. In Ireland, customers using online systems are advised how their data may be used or shared with third-party companies if relevant for processing purposes. Data protection agreements are in place with all third-party providers using registration data. In Spain, the personal data provided in the processing of data of the Immigration Activity are included in the Registry Public Treatment Activities (RAT). This Registry is available through the website of the Ministry of Territorial Policy and Public Function for the exercise of public powers. Rights of access, rectification, deletion and portability of personal data, of limitation and opposition to its treatment, as well as the right not to be subject to decisions based solely on the automated processing of personal data, when appropriate, can be exercised through a dedicated portal.[54]

Germany pointed out that initiatives using blockchain often face challenges in observing the requirements of the GDPR. This is because to process personal data in compliance with the GDPR, it has to be possible to rectify and erase personal data from the blockchain, which is challenging as the key feature of blockchain is that data cannot be altered or corrupted. To address this in FLORA, the BAMF uses a two-step pseudonymisation approach that writes only pseudonymised data on the blockchain. This data therefore only qualifies as personal data when participants possess certain additional off-chain information, which allows the data to be attributed to a natural person. More specifically, the BAMF uses a pseudonymous identifier solution with so-called privacy services. With this solution, each participant operates an off-chain service that maps pseudonymous identifiers used on the blockchain to the IDs used by the participant, in a privacy-compliant, erasable and rectifiable manner. Without the mapping the data on the blockchain cannot be attribute to a natural person. Thus, deleting the mapping in the privacy services anonymises the data on the blockchain.

8. FUTURE OUTLOOK AND CHALLENGES FOR POLICYMAKERS

Beyond the critical issue of the protection of personal data, technological developments may also raise a number of challenges for policy makers.

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While online services are meant to be accessible to all, certain categories of potential clients may face access challenges, for example, if they do not have access to the necessary equipment or have insufficient digital literacy. Potential migrants in countries of origin can avoid expensive and time-consuming travel and waiting time to see consular officials by posting applications or accessing consular services online, but may still face problems, especially where internet connectivity or bandwidth is poor. Mobile phone interfaces can facilitate access to services, but the process may still be complex for inexperienced users and it may still prove difficult to upload the required documents. Data use may be expensive. People with limited digital skills, or with learning difficulties, may also struggle to complete online applications or even access information on how to apply on-line. Similar issues may arise also in destination countries, notably for vulnerable migrants. Online services that are combined with more traditional access to services allow the possibility of in-person meetings and individual support services (e.g. via phone).

TRUST IN DIGITAL TECHNOLOGIES

Some stakeholders – service users and policy-makers - may be reluctant to apply or use technological solutions because of:

- A lack of confidence in how personal data will be used, or in the quality of the outcomes (service users);
- Concerns that AI solutions – just like human decisions - are not immune to errors or even abuse (service users and policy-makers);
- A lack of confidence that the system can guarantee that a positive entry decision will not be granted to an individual who does not fulfil the criteria, thus undermining the credibility of the system (policy-makers);
- Difficulties in detecting forged digital biometric information e.g. morphing attacks (policy-makers);
- Concerns that online language exams may increase the risk of fraud (policy-makers);

49 Getting the future right – Artificial Intelligence and fundamental rights. FRA, 2020; p.11, last accessed 01/02/2022
European Parliament, 'AI Technologies must prevent discrimination and protect diversity' 2021, https://www.europarl.europa.eu/news/en/press-room/20210311IPR99709/ai-technologies-must-prevent-discrimination-and-protect-diversity; last accessed 01/02/2022.

50 In the framework of the single permit.

51 For more information please see: https://gdpr.eu/data-protection-impact-assessment-template/; last accessed 01/02/2022.

52 Digital administration for foreign national in France.

53 The right to be forgotten (RTBF) is the right to have private information about a person be removed from Internet searches and other directories under some circumstances. For more information, please see Art. 17 Right to erase ('right to be forgotten') of Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), available at: https://eur-lex.europa.eu/eli/reg/2016/679/oj; last accessed 02/02/2022.

54 For more information, please see: http://www.mptfp.gob.es/portal/ministerio/proteccion-datos/ejercicio-derechos.htm; last accessed 26/01/2022.

- Risks that malicious websites may mimic real ones and defraud service users (service users and policy-makers).

It is important for public administrations to continuously monitor and evaluate the outcomes of digital solutions, drawing not only on system feedback but also on reports from service users, and that all solutions include correction mechanisms. Maintaining a high level of human control, awareness, and a human redress mechanism, limits the potential for disservice.

RESISTANCE TO INSTITUTIONAL CHANGE

There may be resistance within institutions to the automation of certain tasks, especially when it requires officials to change the way they work or pushes them into new roles. Such transformations take time and require on-going support across changes of government. For that purpose, digitalisation needs to be coupled with improved monitoring. This may increase scrutiny of performance indicators or make more visible statistics and signals; however, it can also lead to a higher workload, where those signals have to be addressed.

RISK OF BIAS

Algorithms are sometimes accused of introducing systematic and repeatable errors that create unfair outcomes, such as arbitrarily privileging one group of users over others. These can be due to biases in the coding itself or in the data used to train the system in identifying risk. As the possibility to track individuals becomes easier, the risk of erroneous blacklisting or tagging may increase as a consequence. Approaches to risk analysis may leave undetected rare, but high-risk, profiles.

Current research into algorithmic bias focuses mostly on algorithms that reflect "systematic and unfair" discrimination. This bias has however been addressed in legal frameworks, such as the European Union's General Data Protection Regulation[55] (2018) and the proposed Artificial Intelligence Act[56] (2021).

55 Regulation of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation), available at: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX-:32016R0679; last accessed 03/02/2022.

56 Proposal for a Regulation of the European Parliament and of the Council laying down harmonised rules on artificial intelligence COM/2021/206 final, available at: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021PC0206; last accessed 03/02/2022.

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Slovenia www.emm.si
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