An enhanced pre-frontier intelligence picture to safeguard the European borders

D7.6
Standardisation and collaboration with other projects

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Abstract	This deliverable reports on the activities of NESTOR task T7.3, which had as main objectives the management of standardisation activities and collaboration between NESTOR and other EU-funded projects.
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Executive Summary

This deliverable reports on the standardisation activities of NESTOR and on the collaboration with other EU-funded projects.

Instead of producing another CEN Workshop Agreement on some result of NESTOR, the project decided to carry out an action to create a preliminary standardisation roadmap for the border management domain. The purpose of the roadmap is to give the stakeholders the basic knowledge and facts about the current border management and standardisation landscapes, and further, to stimulate discussion about standardisation needs and to motivate stakeholders to identify potential new standardisation items. The roadmap should also activate relevant standardisation bodies to initiate plans for standardisation activities and trigger the European policy makers to assess the need of harmonised standards. Finally, it should offer a basis for future EU-funded projects to continue the work started by NESTOR.

NESTOR also decided to combine the two above-mentioned subtasks into one through inviting other EU-funded projects to join the action group for the standardisation roadmap. A total of nine other projects accepted NESTOR's invitation and decided to participate in the planning and implementation of the task. The main synergies achieved through the cooperation included a broader view on the border management domain, a wider network for reaching the experts, and a deeper understanding of the standardisation needs of various border management stakeholders.

The data for the roadmap was collected through table-top research, an online survey and a hybrid workshop organised in cooperation with the European standardisation body CEN-CENELEC, with the support from FRONTEX and DG HOME of the European Commission. The roadmap—which is a public document—will be disseminated to the relevant authorities and organisations representing all standardisation stakeholders.

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Terms and Abbreviations

AI	Artificial Intelligence
BM	Border Management
BMSTF	Border Management Standardisation Task Force
CEN	European Committee for Standardization
CENELEC	European Committee for Electrotechnical Standardization
DG HOME	Directorate-General for Migration and Home Affairs
EU	European Union
EC	European Commission
EDA	European Defence Agency
EN	European standard
ETSI	European Telecommunications Standards Institute
FRONTEX	European Border and Coast Guard Agency
ISO	International Organization for Standardization
IEC	International Electrotechnical Commission
ITU	International Telecommunication Union
NATO	North Atlantic Treaty Organisation
NGO	Non-governmental organisations
NSB	National Standardisation Body
SF-SEC	CEN-CENELEC Sector Forum on Security
SME	Small and Medium-sized Enterprise
TC	Technical Committee
WG	Working Group

1 INTRODUCTION

1.1 SCOPE OF THIS REPORT

The scope of this report is twofold: on the one hand, it describes the standardisation activities of NESTOR, and on the other hand, it reports on NESTOR's collaboration with other projects funded by the European Union (EU). Both of the above-mentioned activities are carried out by T7.3 of NESTOR.

Regarding the standardisation activities, the main purpose of Task T7.3 is to produce a preliminary Standardisation Roadmap for Border Management (BM). The actual Roadmap, which is a public document, is attached to this report as an Appendix as it will be disseminated separately from the confidential report.

1.2 DOCUMENT STRUCTURE

Chapters 2 to 5 of this document consist of material which has been collected or generated for the Roadmap document. Chapter 0 differs from the other Chapters as it addresses cooperation between EU-funded projects.

Chapter 2 describes the border management landscape of Europe, presenting the dual purpose of BM movement of humans and movement of goods—as well as the main actors in the field of European BM.

Chapter 3 portrays the standardisation landscape in Europe, featuring the three geographical levels of standardisation—international, European and national—and the standardisation activities of the military. This section also describes the current status of BM related standardisation in the EU.

Chapter 0 explains how the Action for a Border Management Standardisation Roadmap was carried out by NESTOR alongside nine other EU-funded projects a with the support of some authorities and organisations.

Chapter 5 presents the resulting BM standardisation roadmap including an overview of the results of the above-mentioned action; especially, listing a set of identified potential new work items to be introduced into the standardisation funnel.

Chapter 0 reports on NESTOR's collaboration activities with selected other EU-funded projects; also including a conclusion and assessment of the efficiency of the synergies between the projects.

2 BORDER MANAGEMENT LANDSCAPE

2.1 INTRODUCTION

Border management in Europe is a complex issue due to the continent's many nation states with various borders and their historical, cultural and political diversity. Some member states push for greater national control over their borders in the face of increased migration and security concerns, while the European Commission (EC) has taken steps to harmonize EU BM across its member states through a common visa policy according to the Schengen Agreement and the establishment of a European Integrated Border Management policy that intends to manage the crossing of EU's external borders efficiently and addresses migratory challenges and potential future threats at those borders.

This Section aims at painting a landscape of the European BM, consisting of a description of the dual purpose of BM activities—controlling the movement of humans and goods—as well as an introduction of the European key actors in this domain.

2.2 DUAL PURPOSE OF BORDER MANAGEMENT

Border Management consists of two distinct but closely related processes that are often performed together at international borders: on the one hand, control of movement of humans (Border control), and on the other hand, control of movement of goods (Customs).

Border control refers to the measures taken by a country to regulate the movement of people across its borders. This can include checking the identity and travel documents of travellers, performing security screenings, and enforcing immigration laws. The goal of border control is to ensure that only authorized individuals are allowed to enter the country, and to prevent the entry of people who do not possess the necessary documentation, pose a security risk or are likely to violate the country's laws.

Customs, on the other hand, refers to the process of regulating the movement of goods across international borders. This involves checking the contents of shipments to ensure that they comply with customs regulations and that any applicable duties and taxes are paid. Customs officials may also enforce trade restrictions and prohibitions, such as bans on certain types of goods or restrictions on the import or export of endangered species.

While border control and customs are distinct processes, they are often carried out together at international borders, as both involve the inspection of people and goods crossing the border. In some cases, the same officials may perform both border control and customs functions, while in other cases, different agencies may be responsible for each process. In many countries, these agencies are subordinated to different ministries—e.g. Interior for Border control and Treasury for Customs—which can instigate administrative and communication issues between the officials.

There are some European countries where one agency is responsible for both subdomains (e.g. United Kingdom). To avoid potential administrative issues, in some countries (e.g. Finland) the cooperation between the various agencies is regulated by law and implemented in an efficient and productive way.

2.3 EU BORDER MANAGEMENT

2.3.1 Policies guiding border management

2.3.1.1 Global policies

Borders are the first lines of a country's defence, and the movement of people and trade across them is critical to the health of economies across the globe. There are several global policies that address border management. The key global policy makers and policies include:

- Global Compact for Safe, Orderly and Regular Migration (GCM) by the UN Migration Agency (IOM) [1]
- International Covenant on Civil and Political Rights (ICCPR), adopted by the UN General Assembly [2]
- World Customs Organization (WCO) Framework of Standards to Secure and Facilitate Global Trade (SAFE Framework) [3]
- Organisation for Security and Cooperation in Europe (OSCE) – Border Management [4]
- United Nations High Commissioner for Refugees (UNHCR) [5]
- United Nations Office on Drugs and Crime (UNODC) [6]
- Interpol (the international criminal police organisation) [7]

2.3.1.2 Policies of the European Union

The European Union (EU) has taken steps to harmonize border management across its member states through several policies as described below:

- **Schengen Agreement**: The Schengen Agreement, signed in 1985 and implemented in 1995, abolished internal border controls among most EU member states and established common external border controls. Anyone can move freely between these countries without border controls, while non-Schengen citizens require a visa to enter the area. The Schengen Area includes 27 countries, of which 23 are EU member states, and provides for free movement of people across internal borders. [8]
- **European Integrated Border Management** (IBM) aims at managing the crossing of the EU external borders efficiently and addressing migratory challenges and potential future threats at those borders, thereby contributing to addressing serious crime with a cross-border dimension and ensuring a high level of internal security within the EU, while at the same time acting in full respect for fundamental rights and in a manner that safeguards the free movement of persons within the EU. [9]

- **European Border and Coast Guard Regulation**: This regulation, adopted in 2019, established the European Border and Coast Guard Agency (Frontex) and provides for the coordination and cooperation of member states in managing their external borders. The regulation includes provisions related to border surveillance, search and rescue operations, and returns of irregular migrants. [10]
- **Common European Asylum System** (CEAS) addresses the management of the large numbers of refugees and migrants arriving at the EU's borders. The CEAS aims to ensure that asylum seekers receive a fair and efficient asylum procedure and that member states share responsibility for processing asylum claims. [11][10]
- **Union Customs Code**: The EU's Union Customs Code (UCC) sets out the rules and procedures for customs controls on goods entering and leaving the EU. The code includes provisions related to customs valuation, origin of goods, and customs procedures for certain types of goods. [12]
- **EU Strategic Autonomy** refers to the ability of the European Union to act independently in key areas of foreign and security policy, without relying on the military and economic power of others. The key objective of EU strategic autonomy is reducing the EU's dependence on foreign suppliers of critical technologies and resources, strengthening the EU's defence capabilities and military industrial base. [13]

These EU policies and regulations, along with others, provide a framework for the management of EU borders and promote the efficient and secure movement of people and goods across borders.

2.3.2 Frontex

Frontex, the European Border and Coast Guard Agency, plays an important role in supporting standardisation efforts related to border management and security in the European Union.

The management of the EU's external border is the responsibility of the European Border and Coast Guard Agency (FRONTEX), which was established in 2004. Frontex coordinates the activities of national border guards and assists them in controlling the EU's external borders. The agency also supports member states in processing asylum claims and combating cross-border crime.

Some of the keyways in which Frontex contributes to standardisation include:

- **Capability development**: Frontex is continuously developing its capabilities related to border security technologies, providing and supporting research; promoting and delivering innovation as well as standardisation and harmonisation of border management capabilities, including support for third countries. Research and Innovation activities follow the Capabilities Development Plan (CDP), which includes the capabilities of the Member States and of the agency itself.
- **Driving innovation**: Frontex supports research and innovation related to border management and security, including through partnerships with academic institutions and industry partners. Frontex is developing and driving innovation in methodologies,

processes, procedures and technical solutions for border management, testing and validating them through pilot projects, and collecting ideas by deploying Innovation Cells that capture and inspire further research.

- **Harmonising requirements**: Frontex is harmonising requirements for border management capabilities in accordance with the EBCG Regulation by establishing benchmarks and developing best practices for border management, in line with the CDP.
- **Support for operational activities:** Frontex conducts operational assessments on the effectiveness of border control processes, systems and technical solutions, thereby supporting the operational activities of the Member States and of Frontex operational units, including on the acquisition of technical equipment. [10]

2.3.3 Other EU agencies and organisations

The following sections present shortly some other agencies and organisations cooperating with the responsible Border Management authorities and agencies (in alphabetic order). All of these agencies might have an interest towards standardisation in the border management domain, and they should be encouraged to participate in the implementation of the roadmap.

2.3.3.1 European Commission

There are several Directorate-Generals and agencies of the European Commission which act as stakeholders of Border Management:

- Directorate-General for Migration and Home Affairs (DG HOME) [11]
- Directorate-General for Taxation and Customs Union (DG TAXUD) [12]
- Directorate-General for Defence Industry and Space (DG DEFIS) [14]
- Directorate-General Internal Market, Industry, Entrepreneurship and SMEs (DG GROW) [15]
- Directorate-General for International Partnerships (DG INTPA) [16]
- Directorate-General for Neighbourhood Policy and Enlargement Negotiations (DG NEAR) [17]
- Directorate-General for Maritime Affairs and Fisheries (DG MARE) [18]
- Directorate-General for Mobility and Transport (DG MOVE) [19]
- Joint Research Centre (JRC) [20]
- European Anti-Fraud Office (OLAF) [21]

2.3.3.2 Other European agencies cooperating with border management authorities

- European Union Agency for Law Enforcement Training (CEPOL) [22]
- European Centre for Disease Prevention and Control (ECDC) [23]
- European Defence Agency (EDA) [24]

- European Maritime Safety, incl. CISE (EMSA) [25]
- European Monitoring Centre for Drugs and Drug Addiction (EMCDDA) [26]
- European Network of Law Enforcement Technology Services (ENLETS) [27]
- EU Agency for the Operational Management of Large-Scale IT Systems in the Area of Freedom, Security and Justice (eu-LISA) [28]
- European Union Agency for Asylum (EUAA) [29]
- European Union Agency for Law Enforcement Cooperation (Europol) [30]
- EU Satellite Centre (SatCen) [31]

2.3.4 National border management authorities

Each EU member state has one or several national BM authority/authorities that is/are responsible for managing its borders. The specific name and structure of these authorities can vary from country to country, but they all share a similar set of responsibilities related to border management and security. In most countries, the control of movement of humans is separated from controlling the movement of goods and trade; the first being managed by border / coast guards and the latter by customs officials. In some countries, one authority takes care of both tasks.

2.3.4.1 National border and coast guards

National border and coast guards are government agencies responsible for securing a country's borders and enforcing immigration laws; usually under the jurisdiction of the Ministry of the Interior (or in some cases, the Ministry of Defence). Border guards are typically responsible for tasks such as:

- Controlling and monitoring the movement of people across the border
- Enforcing immigration laws and regulations
- Preventing illegal entry into the country
- Detaining and removing individuals who have entered the country illegally
- Conducting inspections of people, vehicles, and goods crossing the border
- Search-and-rescue operations (especially the coast guards)

Border guards may also work closely with other government agencies, such as customs authorities and law enforcement, to ensure the safety and security of a country's borders. In some cases, border guards may also be responsible for conducting search and rescue operations, combating terrorism, and responding to other national security threats.

2.3.4.2 National customs authorities

National customs authorities are government agencies responsible for regulating and enforcing customs laws and regulations within a country's borders; usually under the jurisdiction of the Ministry of the Treasure. Customs regulations generally relate to the

movement of goods across national borders and are designed to protect a country's economy, environment, and public safety. Customs authorities are usually responsible for tasks such as:

- Collecting import and export duties, taxes, and fees
- Enforcing trade agreements and tariff schedules
- Inspecting goods entering or leaving the country to ensure regulatory compliance
- Preventing the smuggling of prohibited or restricted goods
- Facilitating the movement of goods and people across borders

Customs authorities may also be involved in other related activities, such as trade negotiations and border security measures. These agencies work closely with other government agencies and international organisations to promote trade and ensure compliance with international trade agreements.

2.3.4.3 Cooperation between law enforcement agencies

Cooperation between law enforcement agencies at both the EU and national level is essential for ensuring the security of the EU's borders and for combating crime and terrorism. Cooperation between law enforcement agencies also happens at the national level within EU member states. National police forces, customs agencies, and border control agencies work together to combat crime and ensure the security of their borders.

In many EU member states, there is a central coordinating body that is responsible for facilitating cooperation between law enforcement agencies at the national level. This can be a Ministry or a governmental agency.

Overall, cooperation between law enforcement agencies at both the EU and national level is essential for ensuring the security of the EU's borders and for combating crime and terrorism.

2.4 TRENDS IN BORDER MANAGEMENT

2.4.1 Generic trends in border management

There are several international trends in border management that are emerging in response to the increasing complexity of global security threats and the need for effective and efficient border controls. These trends should be considered when planning future BM related standardisation activities. These trends include the following:

- **Increased use of technology**: Many countries are turning to advanced technologies such as biometrics, facial recognition, and artificial intelligence to enhance border control and management. These technologies can help improve the speed and accuracy of identity checks and risk assessments, as well as improve the detection of illicit goods and dangerous individuals.
- **Focus on risk-based approaches**: Risk-based approaches involve using intelligence and data analysis to identify high-risk travellers and cargo and targeting them for closer

scrutiny at the border. This approach allows border control agencies to focus their resources where they are needed most, and to facilitate the movement of low-risk travellers and goods.

- **Greater cooperation and information sharing**: International cooperation and information sharing are essential for effective border management, particularly in cases where security threats cross national borders. Many countries are establishing partnerships and sharing information with other countries and international organisations to improve border security and combat transnational crime.
- **Enhanced traveller facilitation**: While security is a top priority, many countries are also focused on improving the experience of legitimate travellers. This includes measures such as pre-clearance programs, automated border control gates, and expedited processing for trusted travellers.
- **Adaptation to new security threats**: The nature of security threats is constantly evolving, and border management strategies must adapt to keep pace. For example, many countries are now focused on detecting and preventing the spread of infectious diseases at borders, in addition to traditional security concerns such as terrorism and smuggling.
- **Capability-driven approach**: This approach involves identifying the capabilities needed to achieve specific border management objectives, such as enhanced security or facilitation of legitimate trade and travel, and then developing and implementing strategies to build those capabilities.

2.4.2 Trends in border control

Border control is an important aspect of border management, and there are several trends emerging in this area as well. Some of these trends include:

- **Integrated border management**: Integrated border management involves coordinating and integrating the efforts of all agencies involved in border management, including customs, immigration, police, and other security agencies. This approach ensures that all relevant agencies are working together to achieve a common goal of securing the border.
- **Increased use of biometrics**: Biometric technology, such as facial recognition and fingerprinting, is becoming more widely used at borders to verify the identities of travellers and detect fraudulent documents. This technology can improve the accuracy and speed of identity checks and reduce the risk of identity fraud.
- **Greater use of data and analytics**: Border control agencies are increasingly using data and analytics to identify potential security risks and to target inspections and screenings more effectively. This includes the use of passenger name record (PNR) data, advance passenger information (API), and other data sources to identify high-risk travellers and cargo.

- **Enhanced border security technology**: There is a growing trend toward the use of advanced border security technology, such as X-ray machines, radiation detection systems, and other screening technologies. These technologies can help detect concealed goods, such as drugs or weapons, and prevent their entry into the country.
- **Improved traveller experience**: While security remains a top priority, many border control agencies are also focused on improving the experience of legitimate travellers. This includes measures such as automated passport control gates, expedited processing for trusted travellers, and the use of mobile applications to facilitate border processing.

2.4.3 Trends in customs operations

Customs operations are an important aspect of border management, and there are several trends emerging in this area as well. Some of these trends include:

- **Enhanced use of technology**: Customs agencies are increasingly using technology to improve the speed and accuracy of customs operations. This includes the use of automated systems for customs clearance, risk management systems to target high-risk shipments, and electronic documentation and payment systems to streamline the clearance process.
- **Increased focus on risk management**: Customs agencies are shifting from a rule-based approach to a risk management approach, where resources are focused on high-risk shipments and travellers. This approach helps to improve the effectiveness and efficiency of customs operations, as well as facilitate legitimate trade.
- **Greater international cooperation**: Customs agencies are increasingly working together at the international level to combat transnational crime and improve the efficiency of customs operations. This includes initiatives such as the World Customs Organization (WCO) and the use of common data standards and procedures to facilitate international trade.
- **Emphasis on trade facilitation**: While security is a top priority, customs agencies are also focused on facilitating legitimate trade. This includes initiatives such as the World Trade Organization's Trade Facilitation Agreement, which aims to simplify and streamline customs procedures to reduce the time and cost of cross-border trade.
- **Enhanced focus on compliance**: Customs agencies are increasingly focused on ensuring compliance with customs regulations and preventing fraud and other forms of non-compliance. This includes the use of risk management systems to target high-risk shipments and travellers, as well as the use of advanced technology and data analytics to detect fraudulent activities.

3 STANDARDISATION LANDSCAPE

3.1 INTRODUCTION

Standardisation refers to the process of developing and implementing standards, which are agreed-upon guidelines, procedures, or specifications that help ensure consistency and interoperability across different systems or products.

Standards can be developed for a wide range of purposes, including promoting safety, improving quality, enhancing efficiency, and facilitating interoperability. For example, standards might be developed to ensure that products meet certain safety requirements, that software systems can interoperate seamlessly, or that data is formatted consistently.

There are many benefits to using standards, including reducing costs, improving quality and safety, and promoting innovation. For example, by using a common set of standards, organisations can avoid the need to develop their own proprietary systems, which can be costly and time-consuming. Standards can also help ensure that products and systems are safe and reliable, and that they can interoperate with other systems.

Standards can be developed by a variety of organisations, including national and international standards bodies, the military, industry associations and various consortia. Figure 1 below presents the standardisation landscape with the three geographical levels.

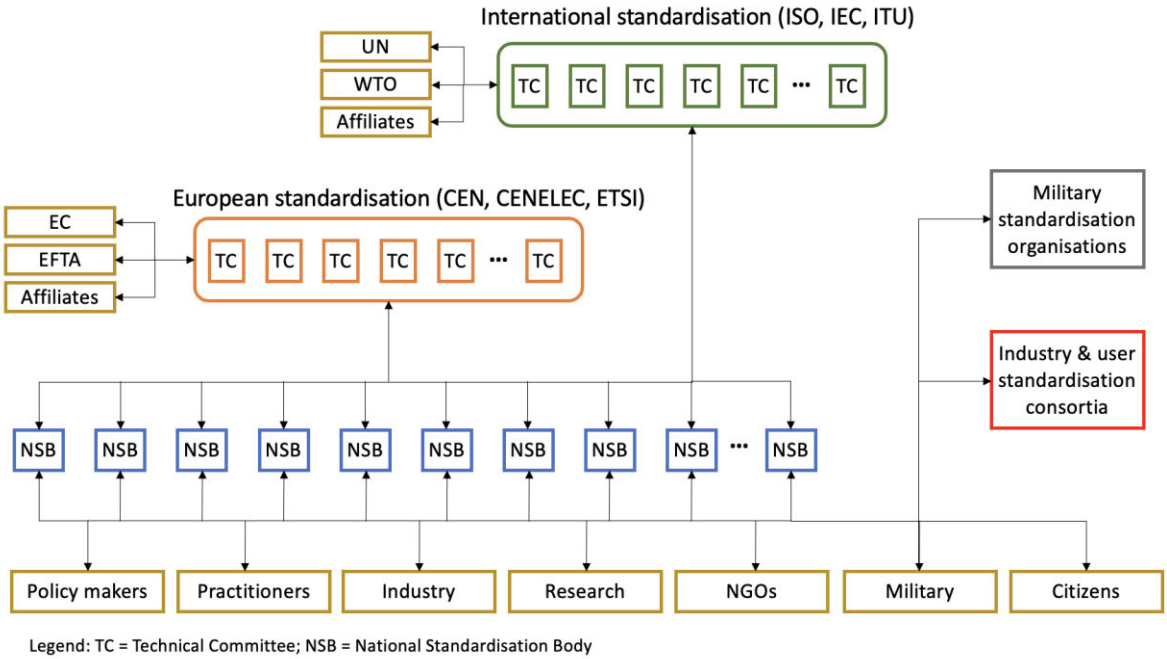

Figure 1: The European standardisation landscape.

As depicted by the previous figure, the standardisation system is based on the National Standardisation Bodies (NSB). Most countries have an NSB, that manages national committees, within which stakeholder representatives draft national standards. The NSBs are

also members of European and international standardisation bodies and provide input for European and international standardisation processes.

In the case of the EU, NSB means a body notified to the Commission by a Member State in accordance with Article 27 of EU-Regulation 1025/2012. Technical Committees (TCs) at European and international level consist of representatives of their respective national mirror committees. Within the European and international TCs, these delegates do not speak on their own behalf, but express the opinion of the national committee. [51]

In the context of border management, standards can play an important role in promoting interoperability and information sharing across different agencies and jurisdictions. For example, standards might be developed to ensure that different border control systems can interoperate seamlessly, or that information can be shared securely between different law enforcement agencies.

3.2 STANDARDISATION STAKEHOLDERS

There are many stakeholders in standardisation, depending on the specific topic, technology, or issue being addressed by the standards under development. Some common stakeholders in standardisation include:

- **Policy makers and authorities** may be involved in standardisation in order to ensure compliance with policies and regulatory requirements or to promote safety and other public policy objectives.
- **Practitioners and first responders** may be involved in standardisation in order to promote public policy goals, such as promoting innovation or ensuring safety, security and interoperability.
- **Industrial enterprises** (incl. SMEs) and industry associations may be involved in standardisation in order to promote their products or services, or to ensure that their products interoperate with other systems. Industry associations represent companies within a particular industry or sector and are often involved in developing and promoting standards that benefit their members.
- **Researchers and academia** may contribute to standardisation by providing expertise and research on technical issues, or by developing new technologies that may eventually be standardized.
- **Non-governmental organisations** (NGOs) may be involved in standardisation in order to promote social or environmental goals, such as promoting sustainability or human rights.
- **Standardisation organisations** take care of the practical aspects of the standardisation process. They offer to the other stakeholders a global organisation with exact rules, processes and principles. They also take care of the business aspect of standardisation as they normally own the IPRs of the developed standards and distribute—against payment—standards to the end users of the documents.

- **Consumers**—although seldom acting as stakeholders in the development process—are the final beneficiaries of standards, as these facilitate access to standardised, safe and high-quality products. Thanks to standards, they are also able to benefit from interoperability of products and systems from different vendors.
- **Military services** have their own standardisation process for development of uniform standards and specifications for military equipment, technology and procedures across different branches of the armed forces in order to ensure interoperability and compatibility between different systems and units.

3.2.1 Policy makers and authorities

Policy makers are another important stakeholder group in standardisation, particularly in areas related to public policy and regulation. These stakeholders can include government officials, regulators, and other decision makers who are responsible for developing policies and regulations related to various industries and sectors.

On the European level, the relationship between the EU and the European Standardisation bodies is defined in EU Regulation 1025/2012 on European standardisation [51].

The role of policy makers in standardisation can include:

- **Setting priorities**: Policy makers can help to identify areas where standardisation can be particularly valuable and can help to prioritize the development of standards in these areas.
- **Ensuring compliance**: Policy makers can use standards to ensure compliance with regulatory requirements through issuing standardisation requests to standardisation bodies and incorporating standards into legal frameworks and regulatory regimes.
- **Encouraging innovation**: By developing standards that promote innovation and technological development, policy makers can help to drive economic growth and competitiveness.
- **Promoting international cooperation**: Policy makers can help to facilitate international cooperation on standardisation, by engaging with international organisations and participating in international standardisation processes.

Some of the constraints that policy makers may face in standardisation include:

- **Balancing competing priorities**: Policy makers may need to balance competing interests and priorities when developing policies and regulations related to standardisation.
- **Managing complexity**: Standardisation can be a complex and technical field, and policy makers may need to rely on experts and stakeholders to help them understand and navigate these complexities.
- **Ensuring accountability**: Policy makers may need to ensure that standardisation processes are transparent, inclusive, and accountable, in order to maintain public trust and confidence.

3.2.2 Practitioners and first responders

First responders and practitioners are an important stakeholder group in standardisation, particularly in the development of standards related to public safety and emergency response. These stakeholders include firefighters, police officers, paramedics, emergency medical technicians, search and rescue teams, and others involved in emergency response.

The drivers for first responders and practitioners to participate in standardisation can include:

- **Safety**: First responders and practitioners are often focused on ensuring the safety of themselves and others and may see standards as a way to promote best practices and reduce risk.
- **Interoperability**: In emergency situations, different agencies and organisations may need to work together, and interoperability standards can help to ensure that communication and coordination are effective.
- **Training and education**: Standards can help to define the skills and knowledge required for different roles in emergency response and can provide a basis for training and education programs.
- **Resources**: First responders and practitioners may have limited resources, and standards can help to ensure that these resources are used effectively and efficiently.

Some of the constraints that first responders and practitioners may face in standardisation include:

- **Limited time and resources**: Like industry stakeholders, first responders and practitioners may have limited time and resources to participate in standardisation activities.
- **Organisational differences**: Different agencies and organisations may have different protocols and practices, which can make it challenging to develop common standards.
- **Complex environments**: Emergency response situations can be complex and unpredictable, which can make it challenging to develop standards that are relevant and effective.

3.2.3 Industry

The role of industry in standardisation can vary depending on the industry and the specific standard being developed. However, in general, industry often plays an important role in driving the development of standards, as standards can provide a way to ensure consistency and interoperability among products, reduce costs, and improve safety and quality.

Industry stakeholders may have a variety of drivers when it comes to standardisation, including:

- **Market access**: Industry stakeholders may see standardisation as a way to access new markets or to compete more effectively in existing markets.

- **Innovation**: Standards can help to facilitate innovation by providing a common platform for the development of new products and technologies.
- **Risk management**: Industry stakeholders may see standardisation as a way to manage risks associated with product safety, security, or environmental impact.
- **Cost reduction**: Standardisation can help to reduce costs by providing economies of scale and reducing the need for custom solutions.

On the other hand, some constraints that industry stakeholders may face when it comes to standardisation include:

- **Time and resource constraints**: Developing and implementing standards can be a time-consuming and resource-intensive process, which can be challenging for smaller companies or those with limited resources.
- **Competing interests**: Industry stakeholders may have competing interests and objectives that can make it difficult to agree on a common standard.
- **Intellectual property concerns**: Companies may be reluctant to share proprietary information or technologies in the development of standards.
- **Regulatory compliance**: Companies may be required to comply with regulations that are not necessarily aligned with industry standards, which can create additional complexity and cost.

3.2.4 Research and academia

The research domain can play an important role in standardisation. Researchers can provide input and expertise on the latest scientific and technological developments, which can be used to inform the development of new standards.

The role and driving factors of the research domain in standardisation can include:

- **Identifying emerging trends**: Researchers can help to identify emerging trends and technological developments that may require new standards to be developed.
- **Conducting research**: Researchers can conduct research on various aspects of standardisation, including the development and implementation of standards, as well as the impact of standards on innovation, competitiveness, and other areas.
- **Providing technical expertise**: Researchers can provide technical expertise on a wide range of issues related to standardisation, including measurement, testing, and certification.
- **Promoting innovation**: Researchers can help to promote innovation in standardisation by developing new approaches and methodologies for developing and implementing standards.

Some of the constraints that researchers may face in standardisation include:

- **Limited resources**: Researchers may face resource constraints, particularly in terms of funding and access to data and other resources.

- **Limited stakeholder engagement**: Researchers may not always have direct access to key stakeholders in standardisation, such as industry representatives and policy makers.
- **Time constraints**: Researchers may face time constraints in terms of developing and conducting research on standardisation issues.

3.2.5 Civil society and NGOs

Civil society organisations and NGOs can also play an important role in standardisation. They can represent the interests of consumers, citizens, and other groups that may not have a direct stake in the development of standards but may be affected by them. There are a number of NGOs that could be interested in participating in standardisation activities related to border management, including:

- **Human rights organisations**: NGOs that focus on human rights issues, such as Amnesty International or Human Rights Watch, may be interested in participating in the development of standards related to border management in order to ensure that these standards reflect human rights principles and protect the rights of migrants and refugees.
- **Environmental organisations**: NGOs that focus on environmental issues, such as Greenpeace or the World Wildlife Fund, may be interested in participating in the development of standards related to border management in order to ensure that these standards reflect environmental principles and protect the natural resources and habitats in and around borders.
- **Refugee advocacy organisations**: NGOs that focus on refugee issues, such as the International Rescue Committee or the United Nations Refugee Agency, may be interested in participating in the development of standards related to border management in order to ensure that these standards protect the rights of refugees and support their safe and dignified passage across borders.
- **Trade organisations**: NGOs that represent the interests of businesses and industries that rely on cross-border trade, such as the International Chamber of Commerce or the World Trade Organisation, may be interested in participating in the development of standards related to border management in order to ensure that these standards facilitate efficient and secure trade flows.
- **Consumer advocacy organisations**: NGOs that represent the interests of consumers, such as Consumer Reports or the European Consumer Organization, may be interested in participating in the development of standards related to border management in order to ensure that these standards protect the safety and rights of consumers who travel across borders.

The role and driving factors of civil society and NGOs in standardisation can include:

- **Advocacy**: Civil society organisations and NGOs can advocate for the development of standards that reflect the interests of consumers and other groups.

- **Participation**: These groups can participate in the standardisation process by providing input and feedback on proposed standards.
- **Awareness-raising**: Civil society organisations and NGOs can help to raise awareness about the importance of standards and their impact on society.
- **Monitoring and evaluation**: These groups can monitor the implementation and enforcement of standards and evaluate their impact on different groups.

Some of the constraints that civil society organisations and NGOs may face in standardisation include:

- **Limited resources**: These groups may not always have the resources to participate effectively in the standardisation process.
- **Limited expertise**: Civil society organisations and NGOs may not always have the technical expertise needed to fully engage with the standardisation process.
- **Limited access**: These groups may not always have direct access to key stakeholders in standardisation, such as industry representatives and policy makers.

3.2.6 Standardisation organisations

Standardisation organisations are stakeholders that take care of the actual development and distribution processes. They are responsible for developing and maintaining standards, and may include international, European and national standardisation bodies, military organisations and industry consortia. The main standardisation organisations are presented below in Sections 3.3 to 3.6.

3.3 INTERNATIONAL STANDARDISATION

3.3.1 ISO

The International Organization for Standardization (ISO) is one of the three international standardisation bodies (IEC and ITU being the other two). ISO is an independent, non-governmental international organisation with a membership of 165 national standards bodies (one member per country). ISO has published more than 23000 standards and has 792 committees and subcommittees where the standards are being developed. All CEN members are also members of ISO.

ISO and CEN have an agreement called the Vienna agreement. The main objective of the Vienna Agreement is to ensure that the best use is made of the resources available for standardisation. It helps ISO and CEN exchange information and increases the transparency of CEN work to ISO members as well as helping to make sure work does not have to happen twice at the regional or international level.

The Agreement underlines the fact that (as stipulated in the WTO Code of Conduct) international standardisation takes precedence over national standardisation. This is because International Standards are designed to help harmonize national standards, and therefore

technical regulations, which helps reduce technical barriers to trade. Ideally, all ISO members should align their own processes with ISO so that approved International Standards can also be simultaneously adopted as national standards in their countries.

Important in the work that ISO is performing within the security and resilience domain is to standardise different tools to facilitate information management, knowledge management, continuity planning and management as well as other processes such as private-public collaboration. [32]

3.3.2 IEC

The International Electrotechnical Commission (IEC) is a non-profit organisation, founded in 1906. The IEC's members are National Committees, which appoint experts and delegates coming from industry, government bodies, associations and academia to participate in the technical and conformity assessment work of the IEC.

Thousands of experts carry out standardisation work IEC in Technical Committees and Sub-committees, in hundreds of working groups, project and maintenance teams. They represent the national electrotechnical needs of IEC's Member and Affiliate countries on the global level. These technical experts are delegated by industry, governments, test and research laboratories, academia and even consumer groups to work on the global, neutral and independent platform of the IEC, where they develop globally relevant, voluntary, consensus-based IEC International Standards.

All CENELEC members are also members of IEC. IEC and CENELEC have an agreement called the Frankfurt agreement similar to the Vienna Agreement between ISO and CEN. [33]

3.3.3 ITU

Founded in 1865 to facilitate international connectivity in communications networks, ITU allocates global radio spectrum and satellite orbits, develops the technical standards to ensure that networks and technologies interconnect seamlessly, and strives to improve access to ICT in underserved communities worldwide. Every time one makes a mobile phone call, accesses the Internet or sends an email, one is benefitting from the work of ITU.

Through its work on standardisation, ITU develops technical standards (known as Recommendations) that facilitate the use of public telecommunication services and systems for communications during emergency, disaster relief and mitigation operations. In such circumstances, technical features need to be in place to ensure that users who must communicate at a time of disaster have the communication channels they need, with appropriate security and with the best possible quality of service. [34]

3.4 EUROPEAN STANDARDISATION

3.4.1 CEN–CENELEC

The European Committee for Standardization (CEN) and the European Committee for Electrotechnical Standardization (CENELEC) are two of the three European Standardisation Organisations that develop European Standards (EN) and other standardisation deliverables for the European market. These two organisations have chosen the model of close cooperation with a joint management centre and decision-making boards. CEN and CENELEC focus on

- Drafting and maintaining of European standards;
- In principle, prioritization of activities at international level through ISO and IEC;
- Promote the European System (ESS) to other regions, sharing its strengths, experience and best practices;
- Enhanced market access opportunities for European industry through increased technical alignment with other regions and countries.

All European standards (EN) as well as any International Standards that are simultaneously approved as a European Standard (i.e. EN ISO), become automatically a national standard for all CEN and CENELEC members. Simultaneously, the NSBs must withdraw any pre-existent conflicting national standards. [35]

No specific standards addressing the needs of Border Management stakeholders have been developed in the framework of CEN and CENELEC. Consequently, there is no specific TC nor a Working Group (WG) for Border Management. The main Technical Committees (TC) in CEN and CENELEC that could be potential “homes” for standardisation activities related to border management are CEN/TC 391 (Societal and citizen security) and CENELEC/TC 79 (Alarm Systems).

The CEN–CENELEC Sector Forum on Security (SF-SEC) is a body that coordinates and supports the development of security-related standards within CEN, in line with the broader strategic goals of the organisation. In addition, the SF-SEC also plays a role as a point-of-contact for EU-funded (e.g. Horizon Europe) research and innovation projects in the security domain in questions related to implementation of the standardisation activities of these projects.

The Border Management Standardisation Workshop of NESTOR was organised in cooperation with the SF-SEC at the CEN-CENELEC Management Centre in Brussels. [36]

3.4.2 ETSI

The European Telecommunications Standards Institute (ETSI) produces technical standards for ICT-enabled systems, applications and services. Like CEN and CENELEC, ETSI also drafts European standards (EN), but also global ETSI Standards (ES). The reason for producing ES standards together with the regular EN standards lays within the organisational idea for drafting globally applicable standards, while on the other hand meeting the European needs

by producing necessary EN standards as being one of the official European Organisations (ESO). ETSI has total of 65 member countries. The European countries have access to a full membership. Countries from outside Europe can join in ETSI as an associate member. Today ETSI holds about 1800 EN standards in its portfolio. [37]

3.5 NATIONAL STANDARDISATION

On a national level, every country has its own national standardisation body (NSB), which are members of ISO/IEC, and in Europe, also of CEN/CENELEC. Most countries, but not all, have separate NSBs for general standardisation and for electrotechnical/ ICT standardisation.

The way standardisation is organised is a national matter, although membership of ISO/IEC and CEN/CENELEC does bring certain obligations regarding e.g. consensus-based decision making within committees, voting procedures, performing national enquiries on draft European and international standards. Usually, the NSBs establish national committees for specific areas. These committees can develop national standards, but they also mirror and participate in CEN/CENELEC and ISO/IEC committees.

3.6 MILITARY STANDARDISATION

As borders are the first lines of a country's defence, this section takes a look at the military standardisation in Europe.

Military standardisation is the process of developing and implementing uniform standards and specifications for military equipment, technology, and procedures across different branches of the armed forces. It is important because it helps to ensure interoperability and compatibility between different systems and units, which is critical for effective military operations.

Military standardisation is critical for effective military operations, as it helps to ensure that different military units and systems can work together seamlessly, even when they come from different branches of the military or different countries. By promoting interoperability and compatibility, it helps to maximize the effectiveness of military resources and enhance overall military readiness.

3.6.1 NATO

North Atlantic Treaty Organisation (NATO) standardisation is a process that seeks to ensure interoperability and compatibility of military equipment, procedures, and communications between the armed forces of NATO member countries. A NATO Standardization Agreement (STANAG) specifies the agreement of NATO member nations to implement a standard in order to meet an interoperability requirement.

NATO standardisation covers a wide range of areas, including communications and information systems, weapons and ammunition, vehicles, logistics, medical support, and

training. Many of these standards could be useful also for civil security agencies, including border/coast guards and customs organisations.

In addition, NATO works closely with partner countries to help improve their border security capabilities, including through training and capacity building programs. These efforts are aimed at enhancing the ability of partner countries to manage their borders effectively, prevent illegal activities such as terrorism and organized crime, and promote stability and security in the region. For example, NATO and the EU have worked together on initiatives such as the Integrated Border Management (IBM) program, which seeks to promote cooperation between countries on border management issues. [38]

3.6.2 EDA

The European Defence Agency (EDA) plays a key role in military standardisation in Europe. The agency was established in 2004 with the goal of promoting defence cooperation and integration among EU member states. One of the key areas of focus for the EDA is military standardisation.

EDA works closely with national defence organisations and industry partners to develop and promote standardisation initiatives across a range of areas, including defence capabilities, equipment and systems, and training and education. EDA also promotes the use of NATO standards, as well as developing and promoting new European standards where needed.

EDA also supports military standardisation through maintaining the European Defence Standards Reference System (EDSTAR), which has been established by EDA in 2011. This web platform contains guidance on the use of roughly 2,500 standards and "standard-like" specifications to optimise effectiveness, efficiency, and interoperability of their application. The web platform is designed to assist governmental organisations and defence industry in the procurement of defence materiel (including development and production). [39]

3.7 TRENDS IN EUROPEAN STANDARDISATION

3.7.1 The strategy of CEN-CENELEC

CEN-CENELEC has recently launched a new strategy "CEN–CENELEC Strategy 2030". The main goal of the strategy is to ensure that CEN-CENELEC remains a leading organisation in the digital age and continues to provide value to its stakeholders. The main goals of the strategy are:

- To enable European stakeholders to benefit from the digital transformation: This goal focuses on ensuring that CEN and CENELEC standards are relevant and useful in the digital age and support the development of new digital technologies and services.
- To drive global relevance: This goal aims to strengthen the position of European standardisation in the global context and promote harmonization of standards worldwide.

- To foster inclusive stakeholder engagement: This goal focuses on enhancing stakeholder engagement in the process, with a particular focus on engaging with younger generations, SMEs, and non-European countries.
- To ensure a future-proof and agile standards system: This goal aims to enhance the efficiency and effectiveness of the standardisation process and to ensure that it is adaptable and responsive to changing needs and requirements.

To achieve these goals, the strategy includes several initiatives, such as:

- Developing and updating a European roadmap that identifies priority areas for and outlines a coordinated approach across different sectors.
- Strengthening partnerships with other organisations and relevant stakeholders, both within Europe and globally.
- Enhancing digital tools and platforms to support more efficient and effective processes and stakeholder engagement.
- Promoting sustainability and social responsibility, including by developing standards that contribute to environmental protection and social inclusion.

3.7.2 The standardisation strategy of the EU

The European Union (EU) has recently launched a New Strategy on Standardisation. The strategy aims to modernize the EU's standardisation system and make it more effective in supporting innovation, growth, and competitiveness of EU businesses. Some of the key elements of the strategy include:

- Strengthening the link between standardisation and innovation: The EU aims to ensure that it keeps pace with technological advances and supports the development of new products and services.
- Promoting international cooperation: The EU intends to strengthen its partnerships with organisations and partners outside the EU to promote global standardisation.
- Facilitating access to standards: The strategy aims to make it easier for businesses, particularly small and medium-sized enterprises (SMEs), to access and use standards.
- Improving transparency and inclusivity: The EU is committed to ensuring that its standardisation system is transparent and inclusive, focusing on stakeholder engagement and participation.
- Ensuring coherence with EU policies: The strategy aims to ensure that EU policies are consistent with other EU policies, such as those related to sustainability, digitalization, and common market. **Error! Reference source not found.**

3.8 STATUS OF BORDER MANAGEMENT STANDARDISATION

In the area of research and innovation, Frontex is continuously developing its capabilities related to border security technologies, providing and supporting research, promoting and

delivering innovation and promoting and delivering standardisation and harmonisation of border management capabilities, including support for third countries.

Frontex has carried out several studies related to standards and standardisation such as the Report on the Interoperability Assessment Programme 2019-2020 [40] and the Management Board Decision 51/2021 addressing Adoption of Technical Standards for the Equipment to be Deployed in Frontex [41] and many other studies contain a lot of interesting data and analysis to be exploited in further standardisation activities related to Border Management.

While the European Standardisation Organisations (CEN, CENELEC, ETSI) have developed standards that can be used in various aspects of border management, such as optical surveillance systems and biometric data exchange, they have not developed a comprehensive set of standards for border management as a whole.

One reason for this is that border management is a complex and multi-faceted issue that involves many different actors and stakeholders, including national governments, border control agencies, law enforcement agencies, and international organisations. Developing a comprehensive set of standards that takes into account the diverse needs and perspectives of all of these stakeholders would be a challenging and time-consuming process.

Another reason is that the EU has developed its own set of regulations and guidelines for border management, which are binding on all member states. These regulations and guidelines cover a wide range of issues related to border management, including visa policy, asylum and migration management, and the use of technology and data in border control. As such, there may be less of a need for comprehensive efforts through CEN.

While there a comprehensive set of European standards for border management may not yet exist, there are still many efforts underway to promote and cooperation among EU member states in this area, including the work of organisations like Frontex and policy makers like DG HOME. The Roadmap developed by NESTOR and its allied projects is one step towards more comprehensive BM standardisation.

4 ACTION FOR A BORDER MANAGEMENT STANDARDISATION ROADMAP

4.1 LAUNCH OF THE ACTION AND PARTICIPATING PROJECTS

4.1.1 NESTOR as the initiator and leader of the action

In the DoA of the NESTOR project, one section on the explanation of the expected impact is named "European standards for interoperable systems". The DoA describes the objective of the standardisation activities as follows:

"A dedicated Task (T7.3) has been foreseen to allow ... the identification of standardisation needs and implementation gaps. ... collaboration with other related projects and initiatives will be established, in order to reach a common decision regarding the features that could be an object of standardisation."

To assess the results of these standardisation activities, the following Key Performance Indicator (KPI) has been introduced in the DoA:

"… reports to maximise the NESTOR overall impact among the stakeholder's community."

In spring 2022, the task T7.3 team of NESTOR discussed the potential activities of the project in the area of standardisation. One of the findings of these discussions was that in the sub-domain of Border Management—contrary to the other sub-domains of security—no ongoing standardisation activities exist on the European or international levels; neither do any plans exist to initiate such activities in the foreseen future. Figure 2 depicts the security sub-domains as they are used in the Horizon Europe programme.

Figure 2: Security sub-domains.

In spring 2022, the T7.3 team decided to implement the task through drafting a preliminary roadmap for standardisation activities related to Border Management. The team further decided to invite other EU-funded projects to join NESTOR in this action.

The aim of the preliminary roadmap is to create a public document ("Border Management Standardisation Roadmap") that will provide the relevant standardisation bodies, policy makers and other stakeholders with recommendations on further standardisation activities in the domain of Border Management. The resulting Roadmap document can be found attached to this report as Appendix C.

4.1.2 Inviting other projects into the action group

To widen the footprint of the action and to take advantage of the knowledge and networks of the partners in other projects in the same domain as NESTOR, the T7.3 team sent invitations to a number of EU-funded (Horizon 2020) projects to join the action.

Almost all invitees (see Figure 3 below) answered positively to the invitation, assigning one or a few representatives to the action team. The action group was founded in a meeting in September 2022, where the objectives, action plan, schedule and responsibilities of the participants were decided upon. The action group had altogether four online meetings to discuss the action; additionally, email discussion was used for communication between the participants of the action.

Figure 3: The participating projects.

As NESTOR is distinctly a project addressing the Border Control—controlling the movement of humans—domain of Border Management, the other projects invited to join the action group come also from the same domain. Some projects oriented in the Customs—controlling the movement of goods—domain were also invited, but none of the invitees decided to join the action.

The projects participating in the action are shortly presented in sections 4.1.2.1 to 4.1.2.9 below. The partners in the Action Group represent various approaches to border control; altogether, BM authorities or practitioners from 23 EU Member States and from eight other European countries are represented in these ten projects. Additionally, other stakeholders—industry, research and the civil society—are widely represented.

4.1.2.1 AI-ARC

The project "*AI-based platform set to enhance the safety and security of the Arctic*" (AI-ARC) presents a highly innovative and user-friendly artificial intelligence (AI) based platform known as the Virtual Control Room. Due to the vast amounts of information collected the potential for information overload is real. This reality can complicate the operational picture; reduce situational awareness and often results in delayed and impaired decision-making. On the other hand, areas such as the Arctic Sea suffer from a lack of communication, surveillance data and rescue assets and without action taken to address these vulnerabilities, the consequences are potentially dramatic in terms of accidents, pollution, border infringements and criminal activities.

AI-ARC is coordinated by Laurea-Ammattikorkeakoulu Oy (Finland) and has BM practitioners and authorities as partners from Iceland, Ireland, Norway, Sweden and Unitec Kingdom. [42]

4.1.2.2 BORDER UAS

The project "*Semi-autonomous border surveillance platform combining next generation unmanned aerial vehicles with ultra-high-resolution multi-sensor surveillance payload*" (BorderUAS) combines for the first time a multi-role lighter-than-air (LTA) unmanned aerial vehicle (UAV) with an ultra-high resolution multi-sensor surveillance payload supporting border surveillance as well as search & rescue applications, and specifically rough terrain detection. The sensor payload includes synthetic aperture radar (SAR), laser detection and ranging (LADAR), shortwave/longwave infrared (SWIR/LWIR) and acoustic cameras for direct target detection, as well as optical and hyperspectral cameras for indirect detection (via vegetation disturbance).

BorderUAS is coordinated by Software Imagination & Vision SRL (Romania), and it has BM practitioners and authorities as partners from Belarus, Bulgaria, Greece, Malta, Moldova and Romania. [43]

4.1.2.3 EFFECTOR

The project "An End to end Interoperability Framework For Maritime Situational Awareness at Strategic and Tactical Operations" (EFFECTOR) boosts maritime surveillance and improve decision support. By implementing an interoperability framework and associated data fusion and analytics services for maritime surveillance and border security, the project fosters collaboration between maritime stakeholders. This allows faster detection of new events and better-informed decision making. Moreover, the joint understanding and undertaking of a situation across borders allows the seamless cooperation between operating authorities and on-site intervention forces, ensuring that all existing privacy and data protection rules are fully respected.

EFFECTOR is coordinated by Secrétariat général de la mer (France) and it has BM practitioners and authorities as partners from Bulgaria, Greece, Montenegro and Portugal. [44]

4.1.2.4 ENTRANCE

The project "Efficient Risk-Based Inspection of Freight Crossing Borders without Disrupting Business" (ENTRANCE) aims to develop and validate a comprehensive user-based toolbox for the risk-based non-intrusive inspection of cross-border freight movements, particularly at the EU Customs Union borders. The aim of this toolbox is to enhance the capabilities of border security practitioners, shielding against a wide range of dangerous and illicit materials with minimum disruption in the cross-border flow of goods. The ENTRANCE toolbox is validated at the EU Customs Union borders by five practitioner-led field trials that are chosen for their relevance, strategic position and feasibility.

ENTRANCE is coordinated by Commissariat à l'Energie Atomique et aux Energies Alternatives) and it has BM practitioners and authorities as partners from Belgium, Bulgaria, Croatia, Ireland and Slovakia. [45]

4.1.2.5 ISOLA

The project “Innovative method for ship passengers’ safety” (ISOLA) develops, tests, deploys, demonstrates and validates a systematic and entirely automated security approach based on the integration of innovative sensing technologies, monitoring, data fusion, real-time alarming and reporting during incidents. The project establishes strategies and methods to easily incorporate solutions that ensure passenger and crew safety within existing ship systems, propose innovative sensor and visual technologies and create a complex collaborative system for monitoring and identifying security risks. The project also proposes early warning methods to prevent security incidents and allows an easy involvement of authorities in case of crisis.

ISOLA is coordinated by Airbus Defence And Space SAS (France) and it has BM practitioners and authorities as partners from Cyprus, Romania and Ukraine. [46]

4.1.2.6 MEDEA

The project “Mediterranean practitioners’ network capacity building for effective response to emerging security challenges” (MEDEA) aims to engage a critical mass of security practitioners and actors including first aid responders, border guards, national police, civil protection teams, humanitarian workers, defence entities and other interested stakeholders in efficient cooperation with cross-discipline entities from other countries. The expected result is an effective response to all security threats common to the Mediterranean and Black Sea region.

MEDEA is coordinated by KEMEA (Greece), and it has BM practitioners and authorities as partners from Albania, Bulgaria, France, Greece, Italy, Portugal, Romania, and Spain. [47]

4.1.2.7 METICOS

The project “A Platform for Monitoring and Prediction of Social Impact and Acceptability of Modern Border Control Technology” (METICOS) aims to create an up-to-date acceptance classification scheme as well as a societal and ethical impact dashboard of border control technologies, to empower three major sub-divisions of the wider border control sector: travellers, border control authorities and service providers. Performance and credibility expectations of smart border technologies from travellers, border management and law enforcement agencies are explored in detail. METICOS aims to create a holistic solution to address challenges for border management, both as regards societal acceptance and efficiency.

METICOS is coordinated by European University Ltd. (Cyprus) and it has BM practitioners and authorities as partners from Cyprus, Estonia, Greece, Romania, and Ukraine. [48]

4.1.2.8 PROMENADE

The project “Improved Maritime Awareness by Means of AI and BD Methods” (PROMENADE) applies AI and Big Data technologies to improve vessel tracking, behaviour analysis and automatic anomaly detection solutions and promote collaborative exchange of information between surveillance authorities. The project delivers an open, service-based toolkit with a high-performance computer platform.

PROMENADE is coordinated by Ministry Of Maritime Affairs and Insular Policy (Greece), and it has BM practitioners and authorities as partners from France, Greece, Italy, Lithuania and Spain. [49]

4.1.2.9 ROBORDER

The project "Autonomous Swarm of Heterogeneous Robots for Border Surveillance" (ROBORDER) aims at developing and demonstrating a fully functional autonomous border surveillance system with unmanned mobile robots including aerial, water surface, underwater and ground vehicles, capable of functioning both as standalone and in swarms, which incorporates multimodal sensors as part of an interoperable network. The system be equipped with adaptable sensing and robotic technologies that can operate in a wide range of operational and environmental settings.

ROBORDER is coordinated by Ethniko Kentro Erevnas Kai Technologikis Anaptyxis (Greece) and it has BM practitioners and authorities as partners from Bulgaria, Greece, Italy, Portugal and United Kingdom. [50]

4.1.3 Cooperation with authorities and other organisations

Three relevant authorities and organisations (see Figure 4) participated in the process as supporters. All invited bodies—DG HOME [11], FRONTEX [10] and CEN-CENELEC [35]—participated in the planning of the action as well as in its implementation, giving the action group valuable support. NESTOR thanks the three supporters!

Figure 4: Three organisations supporting the roadmap action.

4.2 METHODOLOGY OF THE ACTION

4.2.1 Steps of the action

The Action for a Preliminary Standardisation Roadmap for Border Management consisted of four steps as described in Figure 5 below:

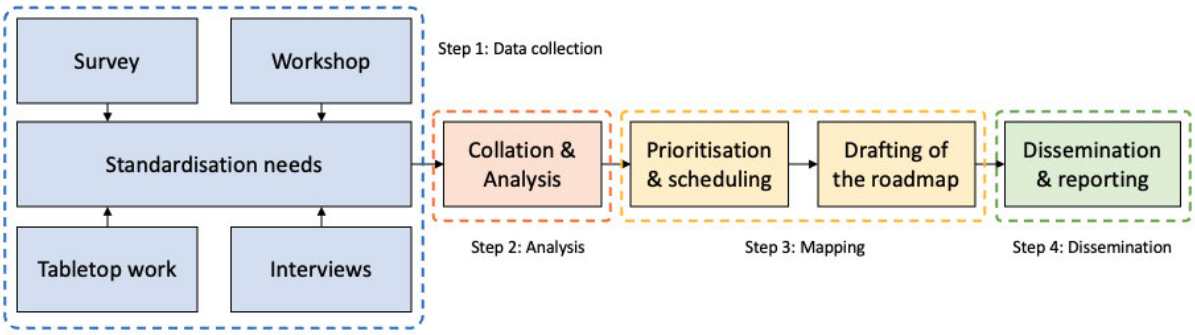

Figure 5: The steps of the action.

1. The action began with **collection of data** for understanding the landscapes of both border management and standardisation in Europe. This included the study of existing policies and policy makers. The data was collected mainly as table-top research on the internet, but it was also collected in discussions with selected representatives of Frontex, DG HOME and CEN-CENELEC.

   The data collection included also the identification of the main stakeholders in border management as well as understanding their roles, drivers and constraints related to standardisation. This was done as table-top research, but also through discussions with representatives of the various stakeholder groups.

   Data related to standardisation needs in the BM area amongst the various stakeholder groups was collected through an online survey and a hybrid workshop. In the collection of data, a set of two taxonomies was used—these taxonomies are explained in Section 4.2.2 below.
2. **Analysis**: The collected data sets were collated and organised in order to find out the most important area where standardisation would be necessary. The collected data and the results of the analysis are presented in Section 5 below.
3. The third step of the Action was the **mapping of the result**s and compilation of the preliminary roadmap into a public document. This includes also prioritisation of the proposed activities and scheduling of the next steps.
4. The last step of the Action is **dissemination** of the resulting Roadmap document and **reporting** to the European Commission.

4.2.2 Selected border management taxonomies

There are several ways to create a taxonomy for Border Management activities. In this action, two different taxonomies are used. The dual taxonomies have also made it easier for the border management personnel and other stakeholders to pinpoint the topics where standardisation activities actually would be urgently needed.

4.2.2.1 Operational taxonomy

The first taxonomy is based on the tasks allocated to border management authorities. It originates from the new Civil Security Market Research (2022) that was organised by DG HOME. According to this taxonomy, the tasks of the border management authorities can be divided in three operational areas, of which the first one (*Irregular migration*) is related to illegal border crossings and actions following them. The two other operational areas are related to normal or legal border crossings; one (*Secure travel facilitation*) addressing the movement of people and the other (*Flow of goods and trade*) the movement of goods. All three 1st level areas are further divided is three 2nd level sub-areas—see Figure 6 below.

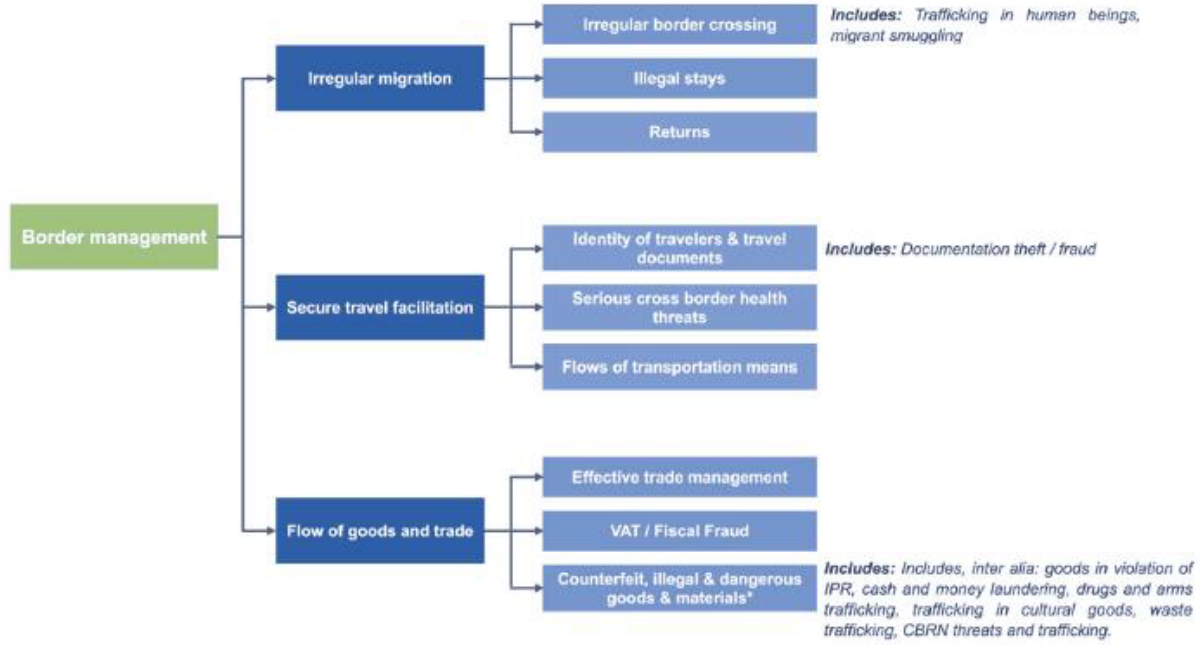

Figure 6: The operational taxonomy © DG HOME.

4.2.2.2 Functional taxonomy

The second taxonomy used in data collection and analysis is based on various functions and organisational concepts applied by border management authorities in fulfilment of their tasks:

- Border management processes
- Technologies and systems
- Interoperability and Integration
- Communication
- Personnel and their effort
- Training and certification
- Physical and cyber security
- Functional safety and risk management
- Privacy and data protection
- Other functional aspects

4.2.3 Roadmapping process

The road mapping process consists of several steps which are presented in Figure 7 below. The first step of the process is getting acquainted with the "landscapes"—structures, principles, main players and trends—of both border management and standardisation. The next phase is identification of the stakeholders involved in these domains, with the driving and constraining factors affecting them.

The third step is to identify a set of needs of the stakeholders and analyse them. This is followed by the setting of objectives and strategic goals for the roadmap, followed by the drafting of an action plan for the future standardisation activities. Finally, the planned activities are prioritised on the basis of their urgency, expected impact and the feasibility of the standardisation work items. The roadmap document is then published and disseminated to all related stakeholder groups and other potential organisations. The last step of the process is reporting to the European Commission who has funded the participating projects.

The process does not end here as the idea is that it will be implemented and used as a basis for future standardisation activities after the NESTOR project has ended.

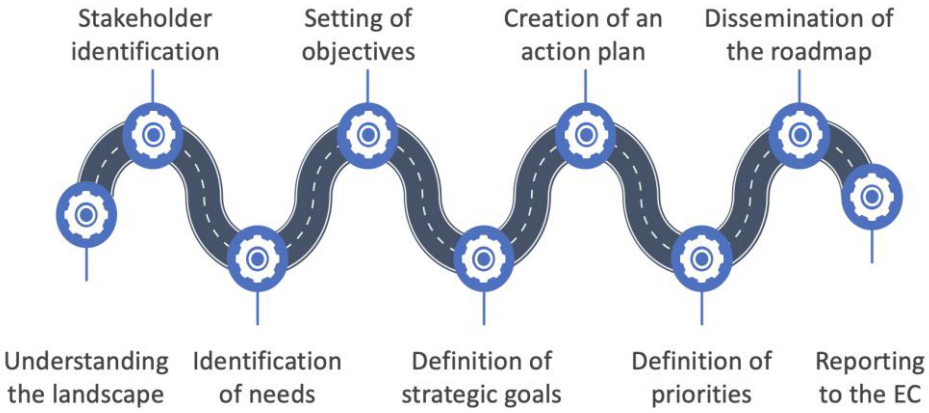

Figure 7: The road mapping process.

4.3 IMPLEMENTATION OF THE ACTION

An implementation plan for the action was decided upon in the September 2022 meeting of the Action Group—see Figure 5 below. The action was carried out during the winter and early spring 2023.

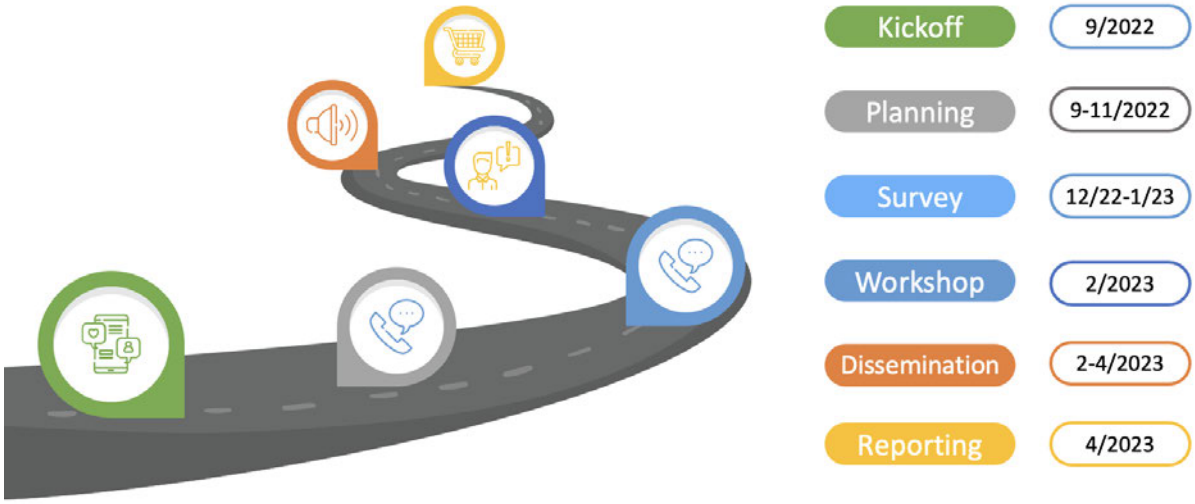

Figure 8: Schedule of the action.

4.4 SURVEY ON STANDARDISATION NEEDS

4.4.1 Organisation of the survey

A survey was organised to collect data about standardisation needs and priorities amongst the BM stakeholders. Google Forms was chosen as a platform for the survey, as its features were seen as appropriate and optimal for the purpose. The questions in the survey and an overview of the results are presented in Section 5.6 below.

A large number of invitations to participate in the survey were sent by NESTOR partners and the nine participating projects. A total of 22 person representing all stakeholder groups answered to the survey, which was open for two months (December 2022 to January 2023). The holiday season and responsibilities related to the closing of the Fiscal Year 2022 and beginning of a new year caught the attention of the potential participants, as the number of answers was lower than expected.

4.4.2 Participants

The participants of the survey represented five different stakeholder groups. There was an even distribution between the groups with the exception of NGOs, as Figure 9 below shows.

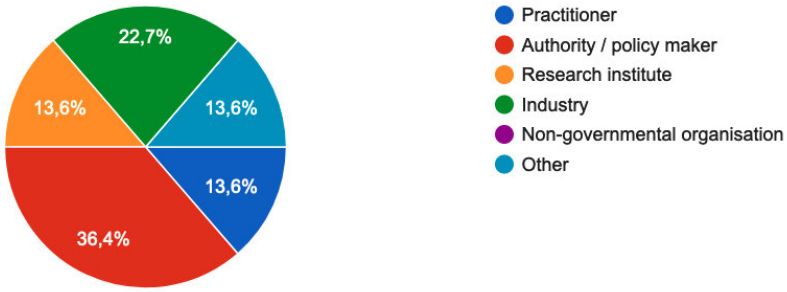

Figure 9: Participants by the type of their organisations.

A total of 11 countries were represented amongst the survey participants; the distribution of the countries is presented in Figure 10 below.

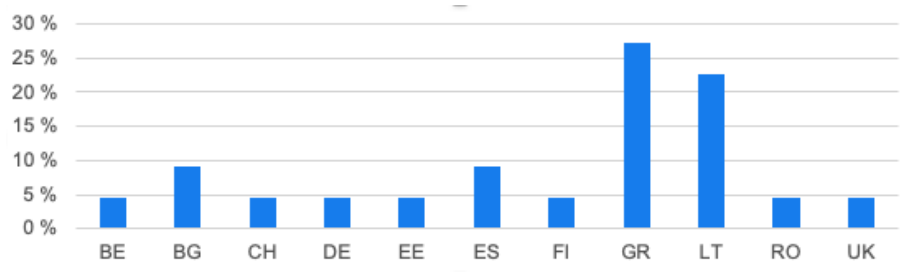

Figure 10: Participants by their home countries.

4.5 WORKSHOP ON STANDARDISATION NEEDS

4.5.1 Organisation of the workshop

The workshop was organised as a cooperative activity of the NESTOR project and the CEN-CENELEC Sector Forum of Security (SF-SEC). The partners of the other participating projects had a role as participants; they also forwarded invitations to the workshop to their networks.

The workshop was organised on 17 February 2023 (10:00 to 16:00 CET) in the CEN-CENELEC Management Centre (CCMC) in Brussels as a hybrid event; in addition to participation onsite, it was also possible to participate online using the Zoom tool that was provided by the CCMC.

The agenda of the workshop consisted of three keynote speeches given by representatives of the supporting organisations (SF-SEC, FRONTEX and DG HOME), presentation of the results of the survey, group discussions about standardisation needs followed by a discussion, and finally a panel discussion. The workshop agenda is attached to this report as Appendix A.

4.5.2 Participants

The participants registered (registration was obligatory) for the event using the Google Forms tool. The total number of registrants was 115 persons, of which 24 physically onsite and 91 online through Zoom. The registrants represented several stakeholder groups, of which BM practitioners, industry and research were the largest ones–see Figure 11 below. The group *Other* contains, among others, consultants, and employees of public organisations.

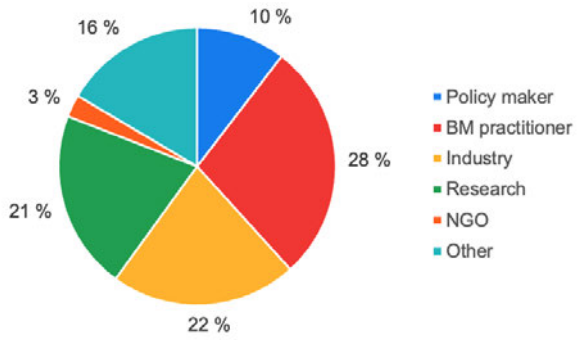

Figure 11: Type of the registrants' organisations.

The registrants were asked, which of the three operational areas was the most interesting for them. The purpose of this was to be able divide the participants (online and onsite) in three groups to discuss the standardisation needs—see Figure 12 below.

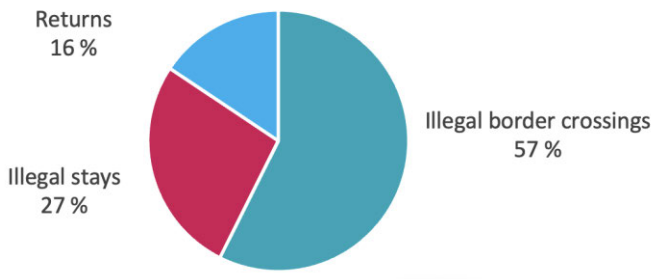

Figure 12: Main interest of the registrant.

As two of the planned discussion groups were significantly smaller than the largest one, the organisers decided to combine the two smaller groups into one as both operational areas are connected to regular border crossings—see Figure 13 below.

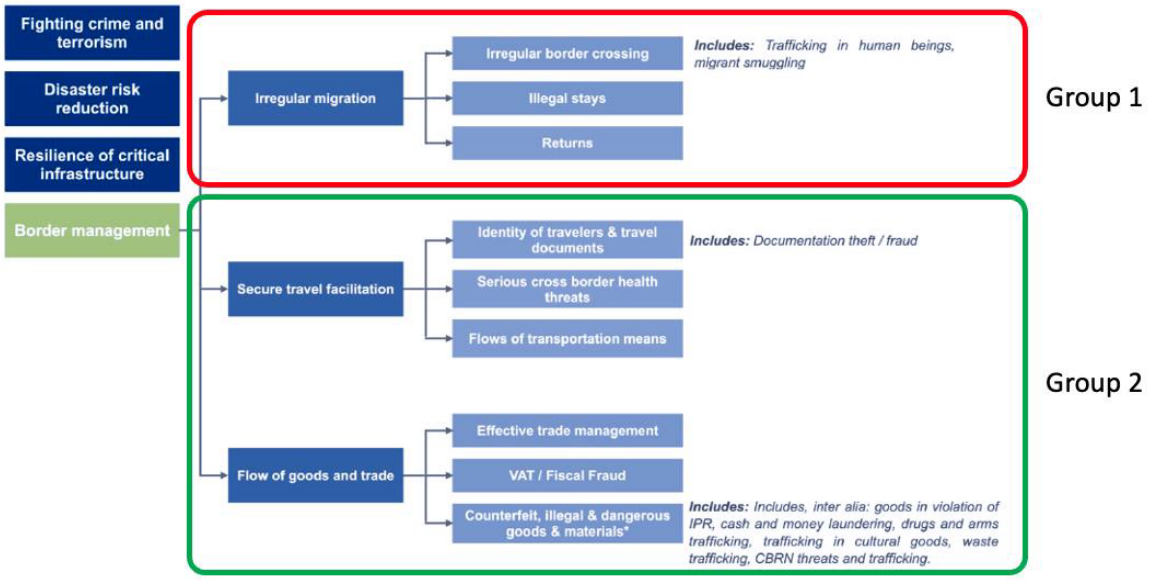

Figure 13: Discussion groups at the workshop.

Both discussion groups contained onsite and online participants. This was partly also done for practical reasons, as only two meeting rooms with displays were available. In group discussions, the Interactive presentation tool Mentimeter [63] was utilised. The tool allows presentation of questions, collection of answers, polling between alternatives and creation of word clouds.

The results of the two discussion groups are presented in Sections 5.7.1 and 5.7.2, respectively. The proposed standardisation items originating from the discussion groups and from the survey are collated and presented in Section 5.8.

All participants registered for physical attendance in Brussels showed up. Some participants left before the event was finished to catch their flights. At the beginning of the day (10:00 CET), there were 60 persons online; during the day the number of online participants varied, being around 30 at the end of the day (16:00 CET). It is also usual that online participants grow tired during a full-day workshop; especially on a Friday afternoon.

5 IMPLEMENTATION OF THE ROADMAP

As the final step of Task T7.3, a Roadmap for Border Management Standardisation has been drafted. The contents of the roadmap have been extracted from this report, leaving out some non-essential parts and ignoring Chapter 0 (Collaboration with other projects). This Chapter describes the basic principles of the roadmap and its dissemination and implementation.

The type of this report is CONFIDENTIAL, but the extracted Roadmap document will be a public one, as it is intended to be distributed to the most important BM standardisation stakeholders.

5.1 STRATEGIC GOALS FOR THE ROADMAP

The Standardisation Roadmap shall fulfil the following strategic goals:

1. The Roadmap will stimulate discussion about standardisation needs in the border management domain;
2. The Roadmap will give all stakeholder groups the basic knowledge and facts about the current border management and standardisation landscapes;
3. The results of the survey and the workshop presented in the Roadmap will motivate—as practical examples—the stakeholders to identify potential new standardisation items;
4. The Roadmap will activate relevant standardisation bodies to initiate plans leading to standardisation activities in the border management domain;
5. The Roadmap will trigger the European policy makers to assess the need of harmonised European Standards (EN) in the border management domain;
6. The Roadmap will be available as source material for future EU-funded projects that will continue the work started by NESTOR.

5.2 FROM A TASK FORCE TO A STANDARDISATION BODY

5.2.1 Formation of a task force

Before any progress in the standardisation pursuits can be achieved, a task force needs to be created. There are several examples of new standardisation work items presented for balloting and even approved as new work items in a Technical Committee, which have, despite the good beginning, perished as there has not been sufficient support from the stakeholders. Especially, support is needed on the national level, as the National Standardisation Bodies are the ones who finally decide upon the approval of a New Work Item Proposal and further appoint experts to a Working Group that begins to develop a new standard.

As agreed between the NESTOR project and the CEN-CENELEC Sector Forum on Security (SF-SEC), the latter will take over the Roadmapping Action when the NESTOR project ends on 30 April 2023. The SF-SEC will continue with the dissemination and promotion of this roadmap

and will activate former partners in the ten Action Group projects to initiate discussion about the standardisation needs on national level. The aim is to create in the fall 2023 a Border Management Standardisation Task Force (BMSTF) consisting of various stakeholders from several Member States to carry on with the BM standardisation action.

5.2.2 From Task Force to Standardisation Body

As soon as the work of the BMSTF is so far that the development of the first standard can be initiated, the work should formally be moved to a standardisation body.

There are two possible levels where the standardisation activities could be carried out, namely international and European. The basic rule is to go for global standards by choosing ISO, IEC or ITU as the "home" of the activities, but in the case of border management the European level would possibly be a better choice, as the circumstances in the EU differ a lot from the rest of the world due to policies like Schengen, the common market etc.—see Section 2.3.1.2.

The body can be either a Working Group (WG) under an existing Technical Committee (TC) or the founding of a new TC dedicated to BM standardisation. The choice between these alternatives depends on many factors such as

- The scope and volume of the expected standardisation activity and the frequency of new work items;
- The availability of sufficient number of experts for the Working Groups;
- The availability of a suitable existing Technical Committee to host a new Working Group;
- The availability of sufficient number of experts and persons willing to act as chair for a new TC and needed WG convenors;
- The availability of a secretariat for the new TC amongst the CEN-CENELEC members (NSBs);
- The opinion of the CEN-CENELEC Technical Board, which makes the final decision.

5.3 NEED FOR PRE-NORMATIVE RESEARCH

In fall 2023, seven (as indicated in the call) new research and/or innovation projects funded by the Border Management call of the Horizon Europe Program 2022 (HORIZON-CL3-2022-BM-01-0X) will take flight. These projects will be contacted by the SF-SEC, and they will be invited to join the BMSTF and to include pre-normative research activities related to Border Management in their research and innovation plans.

These projects should also be encouraged to participate in the standardisation activities of CEN-CENELEC or ISO/IEC on TC and WG levels, and to apply for liaison status with the responsible TC.

5.4 ASSESMENT OF THE ITEMS – PRIORITIES AND SCHEDULING

The presented needs of the limited number of stakeholders that participated in the action represent the personal views of the participants and are based on their professional experience. They are not based on a wider consensus between stakeholder organisations or relevant authorities, but they give a good overview of the issues experienced by the stakeholders today—issues, which could perhaps be removed or mitigated through standards.

To obtain better understanding of the presented needs and potential standardisation items based on these needs, the items in the roadmap should be assessed by the assembled task force. The NESTOR project recommends the ResiStand Assessment Framework (RAF) tool developed by the ResiStand project 2016-2018. It gives good assessment results of the urgency, expected impact (separately for various stakeholder groups), potential ethical–social–legal issues related to the proposed standard as well as its feasibility as a project. As part of the assessment process, the identified topics should also be clustered in groups that in the future could be bases for standard families. [52]

In further elaboration of the roadmap as well as in its implementation, the results of the survey and the workshop as well as the following factors—which are all presented in this document—should be considered and taken into account:

- The global and European policies that regulate and guide BM activities (Section 2.3.1);
- The plans and activities of FRONTEX (Section 2.3.2) and other European organisation involved in border management (Section 2.3.3);
- The generic trends in Border Management (Section 2.4.1) as well as the individual trends in Border Control (Section 2.4.2) and Customs (Section 2.4.3);
- the identified roles, drivers and constraints of each stakeholder group, to ensure that the proposed standardisation items match the expectations of the stakeholders (Section 3.2);
- The identified trends in European standardisation (Section 3.7).

The assessment process requires the participation of experts from several stakeholder groups (preferably from all groups), who work on or have a close relationship with the border management domain. Standardisation organisations should also be involved in the process from the beginning. Based on the results of the assessment, priorities can be defined for the needs, and they can be arranged on a timeline accordingly.

5.5 KEY TOPICS ON THE ROADMAP

The following key topics should be included into the Standardisation Roadmap, and they should be further studied by the task force and preferably by the involved EU-funded BES projects.

Basic standardisation items that should be included in any roadmap are:

- Terminology;
- Classifications (e.g., data and methodologies);
- Security;
- Ethics.

The standardisation in a new domain often begins with the development of a Terminology Standard as this makes all further work much easier as there are unequivocal definitions for all important terms—this is recommended also for BM standardisation activities.

The next action could be the development of an overarching standard to define the framework for the entire domain. This "main" standard would then be supported by a set of standard families; each for a sub-domain (e.g., border control and customs) or topic—this creates a tree-like structure of standards.

The stakeholders should consider whether a Management system standard (MSS) would be necessary—these standards set out requirements or guidance to help organisations manage their policies and processes to achieve specific objectives. MSS are designed to be applicable across all economic sectors, various types and sizes of organisations and diverse geographical, cultural and social conditions. Many MSS have the same structure and contain many of the same terms & definitions and requirements. [53]

Horizontal standards addressing important topics such as security, ethics and privacy should also be included amongst the first new standards.

5.6 RESULTS OF THE SURVEY

5.6.1 Results of the survey

In the first question in the survey, the participant was asked to describe a standardisation need that was important to the participant. The collected standardisation needs are presented in Section 5.8 together with the identified needs collected in the workshop—this practice was selected, because the total number of identified needs was limited, and there were no significant differences between the answers from the survey and the workshop.

The sections 5.6.1.1 and 5.6.1.2 below present the quantitative distribution between the operational / functional areas to which the presented needs are related.

A part of the methodology was that the participant could choose more than one alternative in case the presented standardisation need could bring benefits in several operational areas or subareas.

5.6.1.1 Operational areas where standardisation is most necessary

First, the distribution of the answers according to the operational taxonomy was studied. The participant was asked to choose one or several Level 1 area(s) to which the presented need was related. As Figure 14 below shows, the operational area *Irregular migration* was by far the most frequent.

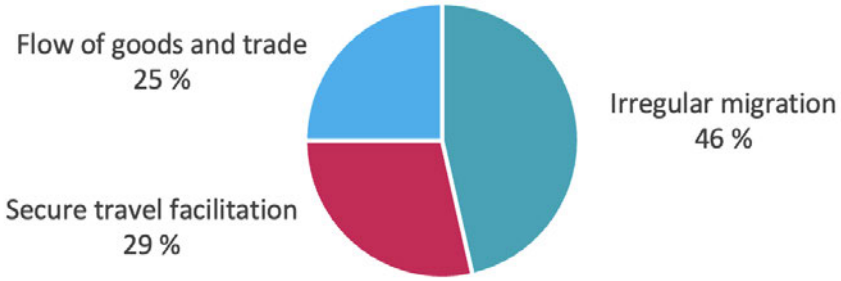

Figure 14: Standardisation needs in the three 1st level operational areas.

The next three questions drilled down in the taxonomy, asking the participant to choose one or several subarea(s), to which the presented need was related. The distribution of the answers is presented in Figure 15 to Figure 17 below. In the operational area *Irregular migration*, the subarea *Irregular border crossings* was by far the most frequent.

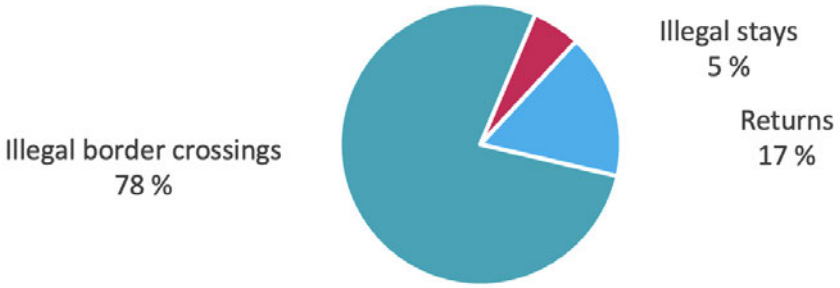

Figure 15: Standardisation needs in the three sub-areas of "Irregular migration".

In the second operational area (*Secure travel facilitation*), the subarea *Identity of travellers & travel documents* was the most frequent, as shown in Figure 16 below.

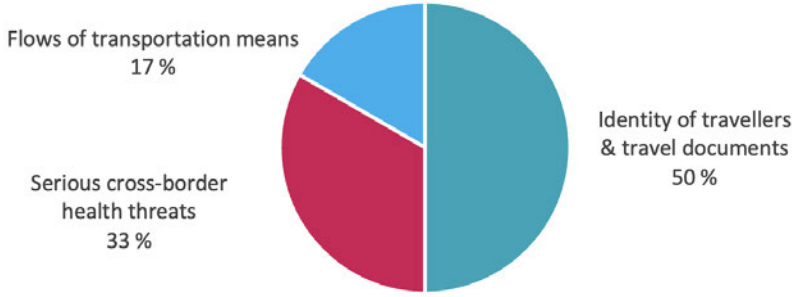

Figure 16: Standardisation needs in the three sub-areas of "Secure travel facilitation".

In the third operational area *Flow of goods and trade*), the subarea *Counterfeit, illegal & dangerous goods and materials* was the most frequent, as shown in Figure 17 below.

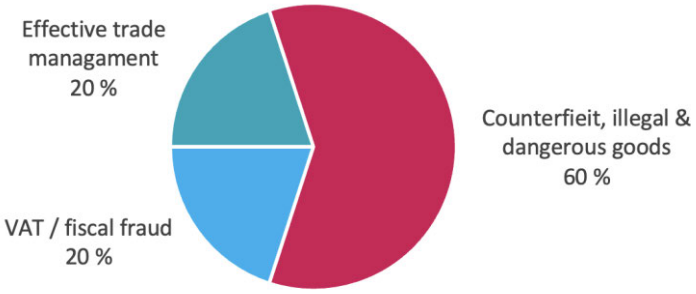

Figure 17: Standardisation needs in the three sub-areas of "Flow of goods and trade".

5.6.1.2 Functional areas where standardisation is most necessary

In the next question the participant was asked to choose a functional area to which the standardisation need is related. As Figure 18 below shows, the functional area *Technologies and systems* was—with more than a half of all answers—the most preferred for standardisation; followed by *Interoperability and integration* and *Border management processes*.

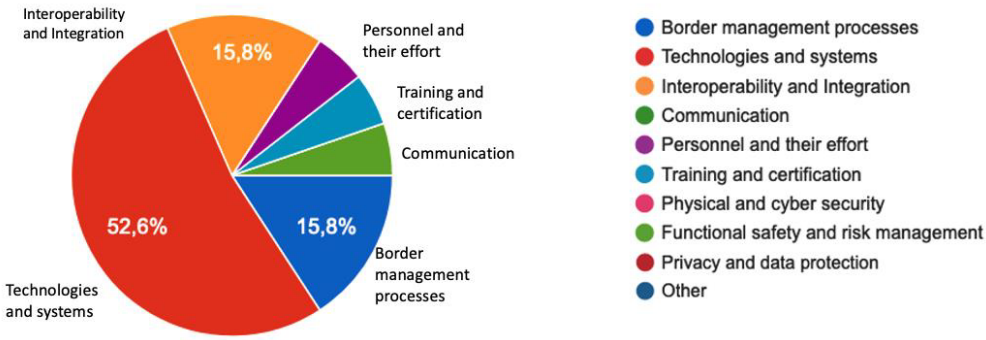

Figure 18: Functional areas where standardisation is most necessary.

5.6.1.3 Types of standards

There are many types of standards; each type addressing a part or section of the activities of BM personnel and other stakeholders. In this question, the participants were asked to choose a type/types of standards that would be most suitable for the new standardisation work item. The answers were split up between the alternatives in an interesting way: On the one hand, technology-related (product and interface) standards were popular, but on the other hand, also process and quality standards were chosen by many participants, as shown in Figure 19.

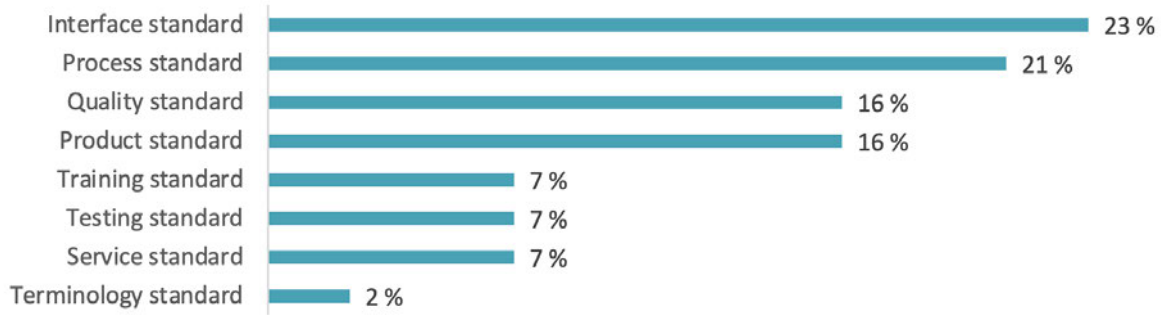

Figure 19: The most necessary standard types.

5.6.1.4 Urgency of standardisation

The last question of the survey addressed the urgency of the standardisation activities. The participant was asked to select one of the five alternatives; the median of the answers lies between 2 and 3 on the five-point scale, as shown in Figure 20.

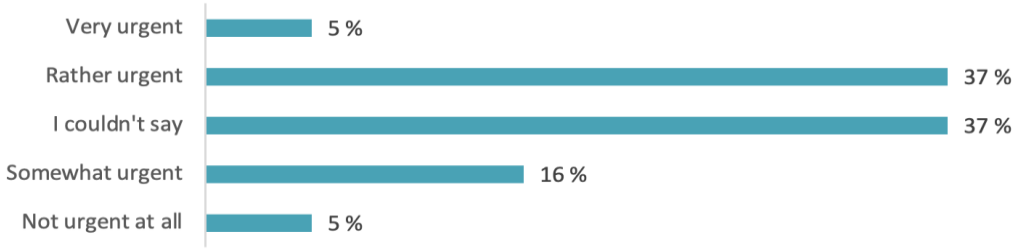

Figure 20: The urgency of standardisation activities.

5.7 RESULTS OF THE WORKSHOP

5.7.1 Results of the workshop – Group 1

This section contains the results from discussion group 1; i.e., persons having the operational area *Irregular border crossings* as their main interest. A total of 18 persons answered the questions in this discussion group.

In addition to the questions and respective results presented in this section, the participants were asked to name one or several specific standardisation need(s). To avoid replication, all needs collected from the survey and the from the two discussion groups at the workshop have been collated, organised and analysed; they are presented in Section 5.8 below.

5.7.1.1 Importance of standardisation

The first question asked from the participants dealt with the general importance of standardisation in the BM domain. The results are shown in **Error! Reference source not found.** below.

Figure 21: Importance of standardisation (Group 1).

5.7.1.2 Standardisation needs and respective operational subareas

The participants were asked to name the most important subarea in the operational area *Irregular migration* regarding future standardisation activities. The subarea *Illegal border*

crossings was by far the most frequent answer—see **Error! Reference source not found.** b elow.

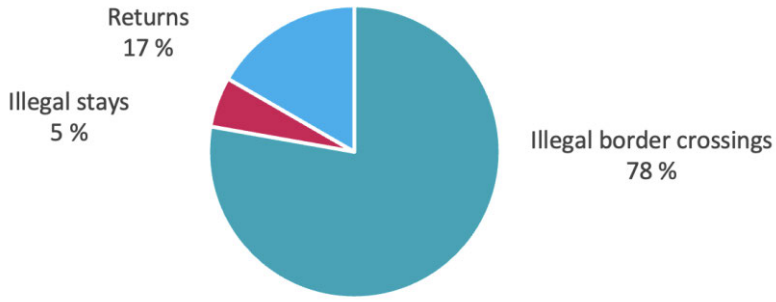

Figure 22: Importance of standardisation in subareas of "Irregular migration" (Group 1).

5.7.1.3 Standardisation needs and functional areas

The next question was about the functional areas of BM. The participants were asked to choose at maximum three functional areas, where standards are most needed; the most important area first (the answers were weighted by the system).

As expected by the organisers, the most frequent area for the participants with main interest in Irregular border crossings was *Technologies and systems*, which could point to a dominance of technical standards. However, the functional area *Border management processes* was almost as frequent, which shows that standards are not only needed for interoperability of products, systems and technologies, but also for harmonising BM processes to improve cooperation between various agencies and also between agencies from various countries—that is, a combination of process and technical standards would offer the best support to the BM stakeholders. This conclusion is supported by the fact that the third most important functional area is *Interoperability and integration*, followed by *Training and certification*. The resulting answers to this question are presented in **Error! Reference source not found.** below.

Figure 23: Most important functional areas for standardisation (Group 1).

5.7.1.4 Types of standards

The reasoning in the previous Section is supported by the results of this question. *Process standards* were seen as most important type of standards, followed by *Terminology standards*

and interface standards. These are needed to facilitate cooperation between practitioners with different backgrounds and/or origins. An interesting observation is that the topic *Technology standards* do not appear here at all. See **Error! Reference source not found.** b elow.

Figure 24: The most necessary types of standards (Group 1).

5.7.2 Results of the workshop – Group 2

This section contains the results from discussion group 2—persons interested mainly in operational areas *Secure travel facilitation* or *Flow of goods and trade*. A total of 11 persons answered the questions in this discussion group.

In addition to the questions and respective results presented in this section, the participant were asked to name one or several specific standardisation need(s). To avoid replication, all needs collected from the survey and the from the two discussion groups at the workshop have been collated, organised and analysed, and are presented in Section 5.8 below.

5.7.2.1 Importance of standardisation

The first question asked from the participants dealt with the general importance of standardisation in the BM domain. The results are shown in **Error! Reference source not f ound.** below.

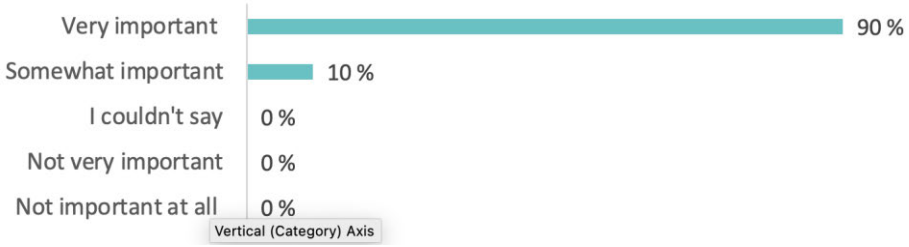

Figure 25: Importance of standardisation (Group 2).

5.7.2.2 Standardisation needs in the three operational subareas of "Secure travel facilitation"

The participants were asked to name the most important subarea in the operational area *Secure travel facilitation* regarding future standardisation activities. The subarea *Identity of*

travellers & travel documents was by far the most frequent answer—see **Error! Reference s ource not found.** below.

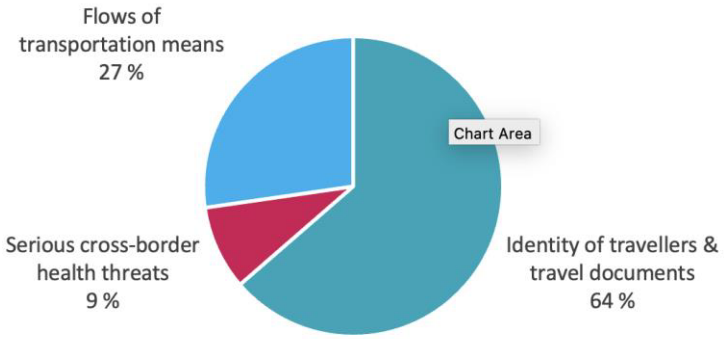

Figure 26: Importance of standardisation in areas "Secure travel facilitation" (Group 2).

5.7.2.3 Standardisation needs in the three operational subareas of "Flow of goods and trade"

The participants were asked to name the most important subarea in the operational area *Flow of goods and trade* regarding future standardisation activities. The subarea *Counterfeit, illegal & dangerous goods* was by far the most frequent answer—see **Error! Reference source not f ound.** below.

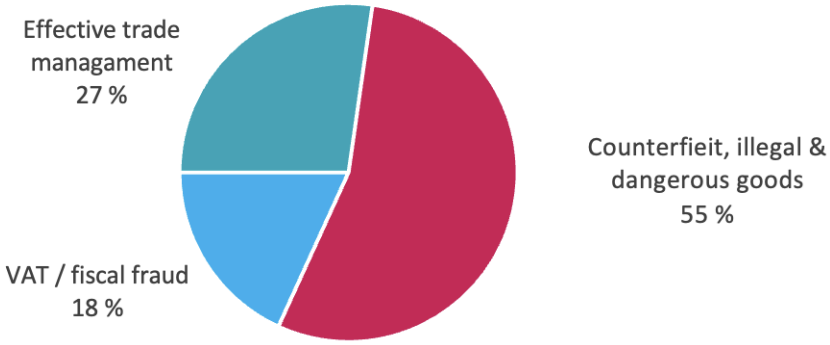

Figure 27: Importance of standardisation in the area "Flow of goods and trade" (Group 2).

5.7.2.4 Standardisation needs and functional areas

The next question was about the functional areas of BM. The participant was asked to choose max. three functional areas, where standards are most needed; the most important area first (the answers were weighted by the system).

The most frequent area in the operational area of regular border crossings was *Technologies and systems* as expected. In this group, the second most interesting functional area was *Interoperability and integration*, and the third one was *Border management processes*—that is, the three most important subareas were the same as in the same question within Group 1, which leads to similar conclusions. The resulting answers to this question are presented in **Error! Reference source not found.** below.

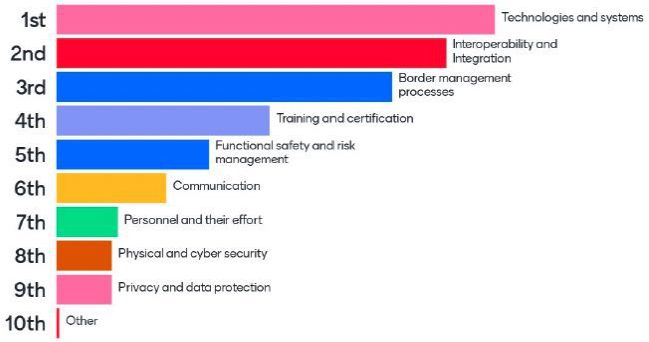

Figure 28: Most important functional areas for standardisation (Group 2).

5.7.2.5 Types of standards

The results of this question differ from Group 1 as Terminology standards do not appear at all amongst the answers—this could mean, that the terms used in the areas related to regular border crossings are better defined and more established than in the area of irregular crossings. See **Error! Reference source not found.** below.

Figure 29: The most necessary types of standards (Group 2).

5.8 IDENTIFIED STANDARDISATION NEEDS

The proposed stakeholder needs that could lead to new standardisation work items are extracted partly from the survey and partly from results of the workshop discussion groups. The needs presented as potential new standardisation items in the next Sections are collated (same or similar needs are combined into one) and organised according to the functional areas taxonomy.

The following tables in sections 5.8.1 to 5.8.5 contain the standardisation needs collected from the participants of the survey and the workshop. Each table presents a potential new standardisation topic and contains the following data:

- sequential number of the need;
- topic which the need is addressing;
- number of proposals received for the topic;

- name of the need;
- description of the need;
- code of the operational area where the need has been identified (see note below);
- type of stakeholder(s) that has/have presented the need;
- type of proposed standard addressing the need;
- urgency of the need on a scale of 1 (very urgent) to 5 (not urgent at all);
- comments, and
- origin of the need (survey or workshop).

Note: below the legend for the codes of the operational area/sub-areas:

1. Irregular migration
1.1 Irregular border crossings
1.2 Illegal stays
1.3 Returns
2. Secure travel facilitation
2.1. Identity of travellers & travel document.
2.2 Serious cross-border health threats
2.3 Flows of transportation means
3. Flow of goods and trade
3.1. Effective trade management
3.2. Counterfeit, illegal & dangerous goods and materials
3.3. VAT / Fiscal fraud

5.8.1 Border management processes

Item:	1	Topic:	Border management requirements		
Proposals:	1	Name(s):	Protecting a common border		
Description(s):		Protecting a common border requires more coordination between the member states. Common framed processes are required and somehow already applied. But we need these requirements to be standardised (as much as security allows). So we could build on a stronger framework in order to improve processes, training, data sharing and management. It would be easier to pick up and implement technologies used by all BS within the EU, especially IT.			
Operational area:		1.1, 2.1, 2.2, 2.3		Proposed by:	Practitioner, policy maker
Standard type:		Terminology, Service, Process, Interface, Testing, Training		Urgency:	1
Origin:		These proposed items originate from the survey.			

Item:	2	Topic:	Other border management processes and harmonisation
Proposals:	17	Name(s):	Process standardisation Common standards in EU Standardised processes for data collection Common procedures for identification etc.
Description(s):		Process , along with the technological ones, to close the loop between how passengers are checked and how the technology can help in speeding up the checking and making it more reliable and accurate.	

	Requirements in terms of documents and formats that can speed up the checking at borders and can be shared between different authorities and borders check to validate the passengers Common standards for returns Common performance requirements for cross border cargo inspections Need to standardize identification and documentation processes at all borders Need to have a common way to identify traveller, origin, destination, nationality, ... that can be easily exchanged and found out if necessary Avoiding distinctions between entering one country or another that may increase the use of certain routes Need of collective action and common policies among countries with the external EU borders - flows of transportation means Checks of minors at BCPs (passport but also personal confirmation). Child sleeping at the back of car may be drugged. Needs to be a common regulation to ensure the child matches the ID document at every EU border Need of processes in the collection and usage of data - identity of travellers Non-discriminatory profiling standards for when to perform physical checks to search for illegal/counterfeit goods Standardisation for the processes associated with the assistance of people with special needs. Common strategy between EU member states on the identification topic Standardisation of transliteration schemes for languages using non-Latin alphabets (e.g. for breeder documents) Standards for travel documents Illegal border crossings - data collection and reporting		
Operational area:	1,2,3	Proposed by:	all stakeholders
Standard type:	Terminology, Service, Process, Interface, Testing, Training	Urgency:	1-3
Comments:	These proposed items originate from the group discussions at the workshop.		

5.8.2 Technologies and systems

Item:	3	Topic:	Radio frequency monitoring
Proposals:	2	Name(s):	RF Monitoring Site Radio and Telecommunication Awareness
Description(s):	Requirements of a RF Monitoring site with Direction Finding capabilities. Basic requirements for RF Monitors at borders should be standardized and if possible harmonized with those of national spectrum authorities who use existing monitoring stations already. Requirements deal with frequency ranges, processing bandwidths, localization capabilities, antennas, interfaces of receivers and setup options.		
Operational area:	1.1, 3.2	Proposed by:	Industry

Standard type:	Product, Process, Interface, Testing, Quality	Urgency:	3
Comments:	These proposed items originate from the survey.		

Item:	4	Topic:	Chemical detection
Proposals:	1	Name(s):	Chemical detection systems operation
Description(s):	Use of chemical detection systems for safety and security applications onboard passenger ships		
Operational area:	2.2	Proposed by:	Industry
Standard type:	Product, Process, Quality	Urgency:	2
Comments:	These proposed items originate from the survey.		

Item:	5	Topic:	X-ray technologies
Proposals:		Name(s):	Practical safety with XR technologies
Description(s):	The need is quite narrow framed by research interests, towards the use of novel technologies and virtual or augmented reality in border surveillance, in field conditions where there are specific needs for practical safety (visibility, usability) to support persistent use beyond mere technology demonstrations and pilots. There are known issues with user comfort, novel interaction methods and visibility which influence field operators' ability for situational awareness that can support fast decision making required in this context. In my opinion standards are needed for minimal requirements on these aspects for safe use of XR.		
Operational area:	3.1	Proposed by:	Research
Standard type:	Interface, Quality, Training	Urgency:	2
Comments:	These proposed items originate from the survey.		

Item:	6	Topic:	Other technologies
Proposals:	7	Name(s):	N.A.
Description(s):	Geospatial information connected to other sources of information. Exchange of information in machine readable format (sensor outputs, events, semantic interpretation, ...) Identification of irregular migrants through social media platforms using Artificial intelligence Detection standards (existing ones like Johnson's are obsolete) Data Fusion Services Standards for surveillance systems: target detection, classification, risk assessment, prediction of future states Standardised testing of technologies The need to identify false or fake ID documents easily, fast and reliably.		

Operational area:	1-3	Proposed by:	all stakeholders
Standard type:	all types	Urgency:	1-4
Comments:	These proposed items originate from the group discussions at the workshop.		

5.8.3 Interoperability and integration

Item:	7	Topic:	Interoperability and integration
Proposals:	3	Name(s):	Interoperability EIBM systems Interoperability System interface standardisation Cross-border information exchange
Description(s):	Interoperability is the ability of information systems and the procedures they support to share data and enable the exchange of information and knowledge between them. Interoperability between the different systems that EIBM authorities are currently using, so as to facilitate their communications/collaboration and joint operations. Border surveillance equipment (thermal imaging devices, various sensors) currently operated by law enforcement agencies lack a standardised industry communications and implementation protocol, in order to incorporate these various independent systems into a unified platform (e.g. a C2 environment) thus increasing cost both in fiat and time. For example, most legacy devices use analogue communication protocols and require specific knowledge of the output channels in order to transmit the image from a remote surveillance site to the headquarters and at the same time require tedious work in order to implement basic remote operation commands. Most of the times such attempts lead to poor results, if not at all. Effective way of transmitting / exchanging of maritime irregular migrant crossings / activities (i.e. last known position / time / speed and direction) between immigration authorities and other response organisations (e.g. search and rescue) across borders.		
Operational area:	1.1, 2.2, 3.1	Proposed by:	Policy makers, Practitioners
Standard type:	Product, Interface	Urgency:	2-3
Comments:	These proposed items originate from the survey.		

5.8.4 Communication

Item:	8	Topic:	Information sharing
Proposals:	1	Name(s):	Remote database
Description(s):	In order to apply the European legislation in a unified way, it is necessary to create a database that can be used remotely by all workers scheduled to work (at state border crossing points, in cars used by law enforcement, etc. .) Returns – communication process between relevant actors involved in the process		
Operational area:	1.3, 2.1, 3.2	Proposed by:	Practitioner
Standard type:	Process, Interface	Urgency:	2
Comments:	These proposed items originate from the survey.		

Item:	9	Topic:	Terminology		
Proposals:		Name(s):	Common terminology in EU		
Description(s):		Same terms should be used—even if translated—in various EU countries			
Operational area:		1-3		Proposed by:	unknown
Standard type:		Terminology		Urgency:	1
Comments:		These proposed items originate from the group discussions at the workshop.			

Item:	10	Topic:	Terminology		
Proposals:		Name(s):	Transliteration schemes		
Description(s):		Standardisation of transliteration schemes for languages using non-Latin alphabets (e.g. for breeder documents)			
Operational area:		1-3		Proposed by:	unknown
Standard type:		Terminology		Urgency:	2
Comments:		These proposed items originate from the group discussions at the workshop.			

5.8.5 Functional safety and risk management

Item:	11	Topic:	Harmonised forms		
Proposals:		Name(s):	Standardised health forms for all MS		
Description(s):		Due to pandemic different health forms on border in different countries, they should be similar (standardized) for all MS			
Operational area:		2.2		Proposed by:	Policy maker
Standard type:		Process		Urgency:	2
Comments:		These proposed items originate from the survey.			

5.9 DISSEMINATION OF THE ROADMAP

The attached Roadmap document is public, and it will be disseminated widely by NESTOR and the other related projects to the following organisations:

- Related EU-funded projects;
- Relevant standardisation bodies on national, European and international level;
- Relevant directorate-generals and agencies of the European Commission;
- Other relevant EU bodies;
- Global policy makers and authorities in the BM domain;
- National border management policy makers, authorities and agencies;
- Industrial enterprises and their associations;

- Research & Technology Organisations and the Academia;
- Relevant global and European NGOs.

The public white paper "*Border Management Standardisation Roadmap*" can be downloaded from the NESTOR website at

https://nestor-project.eu/standardization-roadmap/.

6 COLLABORATION WITH ONGOING PROJECTS

6.1 GENERAL REMARKS ON COLLABORATION AND SYNERGIES

EU-funded projects are strongly encouraged by the European Commission to collaborate with peer projects always when it is possible, reasonable and mutually beneficial. By leveraging synergies and finding ways to work together, EU-funded projects can optimise their use of resources, reduce costs, and maximize the value of their activities.

Collaboration and cooperation between EU-funded projects can bring about several benefits of which some are presented below:

- **Knowledge sharing**: When projects collaborate and cooperate, they can exchange valuable knowledge, expertise, and best practices. This process fosters learning and innovation within the project teams, allowing them to build upon each other's work and avoid duplication of efforts.
- **Enhanced use of resources**: Collaboration enables the pooling of resources, such as infrastructure, equipment, and research facilities. By sharing these resources, projects can optimize their utilization, reduce costs, and achieve more significant outcomes than they could individually.
- **Increased Impact**: Collaboration amplifies the potential impact of individual projects. By aligning their objectives and activities, projects can achieve larger-scale results and generate a broader societal or economic impact. This is particularly important in areas where coordination and cooperation are vital, such as infrastructure development or environmental sustainability.
- **Networking and partnership**s: Collaborative efforts foster networking and partnership opportunities between project teams, organisations, and stakeholders. These connections enhance cross-sectoral cooperation, promote knowledge exchange beyond the project duration, and may lead to future joint initiatives or commercialization prospects.
- **Influence on policies**: Collaborating projects can collectively contribute to shaping policies, regulations, and standards within their respective fields. By consolidating their expertise and research findings, they can provide evidence-based recommendations and influence decision-making processes at regional, national, or international levels.
- **Capacity Building**: Collaboration nurtures the development of skills and capacities among project teams. Through interactions, sharing experiences, and joint activities, participants can enhance their knowledge, teamwork abilities, and project management skills. This facilitates professional growth and long-term sustainability.
- **Cost savings**: the collaborating parties can significantly save in costs through sharing resources such as equipment, facilities, databases, or software licenses, economies of

scale, avoidance of redundant work, joint funding of activities and sharing of risks associated with research, and development.

- **Synergistic solutions**: Projects working together can leverage their collective strengths and capabilities to develop comprehensive and holistic solutions to complex challenges. By combining different perspectives, disciplines, and approaches, they can address multifaceted problems more effectively.

The last point in the list above is probably the most important and lucrative motive for deeper collaboration between projects, as the highest benefits can be created only if the collaborating projects can identify and bring about real synergies.

Synergy refers to "*the combined power of a group of things when they are working together that is greater than the total power achieved by each working separately*". [64] In other words, synergy occurs when the collaboration or combination of different parts or entities results in an outcome that is more significant, valuable, or impactful than what each part could have achieved on its own.

While cooperation focuses on working together towards a common goal, synergy goes beyond that by emphasizing the amplified, mutually beneficial effects that arise from the collaboration. It implies that the whole is greater than the sum of its parts. [54], [55]

In addition to the typical smaller-scale mutual cooperative communication and dissemination in webinars and conferences organised by the projects, NESTOR decided to concentrate in two collaborative actions:

Firstly, the NESTOR project organised in cooperation with other EU-funded projects the Border Management Standardisation Action that is described in the earlier Chapters of this report— see the remarks in Section 6.2 below.

Secondly, the NESTOR project joined the H2020 BES Cluster together with a number of other EU-funded projects— see the remarks in Section 6.3 below.

As said, NESTOR has additionally had some smaller scale cooperation with other projects— these are listed in NESTOR D7.5 (Dissemination and Communication).

6.2 THE STANDARDISATION ROADMAP ACTION

The planning and implementation of the Border Management Standardisation Roadmap action together with nine other EU-funded projects and the CEN-CENELEC Sector Forum on Security (SF-SEC) has been described in detail in Chapter 4 of this report; to avoid redundancy, the same is not repeated here. However, we wish to bring to the reader's attention the identified synergies and benefits to the participants of this action.

The cooperation brought about several benefits to NESTOR and the other projects. The identified benefits of the collaboration are listed below, and they match well with the list of potential benefits as listed in Section 6.1 above.

1. As the partners in all projects included representatives of several stakeholders, the cooperation allowed the organising team (NESTOR T7.3) to reach more stakeholders; especially to better cover the European national border control authorities—together, the group had as partners a total of 31 authorities and practitioners from 23 EU Member States and from eight other European countries, as well as many other stakeholders.
2. As some of the projects had started earlier than NESTOR and thus had more experience on operating as a project on the BM domain, the team could build upon the earlier work of these projects.
3. Through the large number of partners in the entire group, the combined network of the partners was very large, which helped in reaching the stakeholders to be invited to join the survey and the workshop.
4. Further, the large number of participating partners facilitates wide and well-covering dissemination of the roadmap amongst the various stakeholder groups, which in turn can lead to increased impact.
5. The fact that the action was carried out jointly by ten projects made it more interesting and credible in the eyes of the European BM authorities (FRONTEX, DG HOME) and standardisation bodies (CEN–CENELEC). This means the resulting roadmap will have better chances to be taken into account by the mentioned parties.
6. Although all participating projects are addressing border control and management, they each have a different point of view. This has widened the understanding of the participating projects, allowing capacity building amongst the participants partners.

In addition to the collaboration with other projects, NESTOR cooperated also with other organisations. The cooperation with DG HOME, the European Commission's directorate-general responsible for migration and home affairs, and FRONTEX, the European Border and Coast Guard Agency, was very productive as the representatives of these agencies helped the action team to understand the policies and future plans for standardisation in the area of border management. Bothe organisations participated also in the workshop and delivered a keynote speech each.

The cooperation with the CEN-CENELEC SF-SEC brought two significant benefits to the action group: firstly, CEN-CENELEC welcomed the action group to organise the workshop at their premises in Brussels—this allowed the project to save significantly in venue and lunch costs and boosted the marketing of the event. Secondly, NESTOR and the Sector Forum have agreed that the latter will take over the leadership of the standardisation action after the end of NESTOR at the end of April 2023, which offers a more credible forecast to the future of the standardisation action and thus increases the probability of a wide and deep impact through the future standardisation activities.

6.3 H2020 BES CLUSTER

The BES cluster was initiated by the METICOS project [48] and started its activities in May 2021 amongst six H2020 projects operating in the area of border management; today, the number of participating projects has grown with several new partners. On the other hand, some of the participating projects have ended.

Today the BES cluster consists of 15 member projects:

- TRESSPASS (Robust risk based screening and alert system for passengers and luggage) [56];
- MIRROR (Migration-related risks caused by misconceptions of opportunities and requirement) [57];
- ITFLOWS (IT tolls and methods for managing migration flows) [58];
- PERCEPTIONS (Understanding the impact of narratives and perceptions of Europe on migration and providing practices, tools and guides for practitioners) [59];
- PERSONA (Privacy, ethical, regulatory and social "no-gate crossing point solution" acceptance) [60]
- EFFECTOR (End to end interoperability framework for maritime situational awareness at strategic and tactical operations) [44]
- D4FLY (Detecting document fraud and identity on the fly) [61]
- BORDER UAS (Border unmanned aerial system) [43]
- iMars (Image manipulation attack resolving solutions) [62]
- ROBORDER (Autonomous swarm of heterogeneous robots for border surveillance) [50]
- ISOLA (Innovative & integrated security system on board covering the life cycle of a passenger ships voyage) [46]
- NESTOR (An enhanced pre-frontier intelligence picture to safeguard the European borders)
- PROMENADE (Improved maritime awareness by means of AI and BD methods) [49]

The projects that participated in the Standardisation Roadmap action, are presented in more detail in Section 4.1.2.

The aim of the Cluster is to provide relevant information to support the dissemination and communication activities of the projects, inform about good practices and methodologies to combine pilot activities as well as work together on future policy suggestions. Additionally, the Cluster cooperates for a wider impact of the sustainability exploitation plans of the relative projects.

The NESTOR project joined the Cluster to exchange information, share tips, organize everyday dissemination activities, call for support and communicate projects' activities. Especially, the

Cluster supports the projects to upcoming challenges, ensures effective dissemination and exploitation potentials, and generates knowledge to broaden the communication results.

6.4 OTHER ACTIVITIES

Additionally to the projects participating in the Roadmapping action and the BES Cluster, NESTOR has had cooperation with a few other projects, such as COURAGEOUS [66], FLEXI-cross [67] and MELCHIOR [65].

7 CONCLUSION

7.1 STANDARDISATION ACTIVITIES

The T7.3 team responsible for the standardisation activities of NESTOR made the decision of not to take the most obvious approach of drafting a CEN Workshop Agreement (CWA), which is a pre-standardisation deliverable usually addressing a result of the project. The problem in a short project is that that when the results are more or less ready and the CWA work could be started, there isn't any more enough time to carry out the necessary process. Therefore, the standardisation roadmap action was a good choice as it could be done separately from the technical development effort of the project.

Another reason why the T7.3 team is satisfied with the decision is the fact that a single pre-standardisation deliverable would not promote wider standardisation activities in the border management domain. For such longer-term visions, the drafting of a roadmap was just the right thing to do, as the roadmap is expected to wake interest and give a basis for further development, thus filling the strategic goals set for it (see Section 5.1 above).

The resulting roadmap is preliminary and there may be a few shortcomings in it. The time for the action was short due to the modest length of NESTOR (18 months) and the resources for the standardisation activities were limited. Also the available sample—number of participants in the survey and in the workshop—was low compared with the total number of related stakeholders in Europe.

However, the NESTOR project is quite confident that the results obtained during the action are representative as all stakeholder groups from several countries were represented in the survey and the workshop. The results give a good overview of the issues experienced by the BM stakeholders in their daily work.

7.2 COLLABORATION WITH OTHER PROJECTS

The decision to include twofold contents—standardisation and collaboration—to Task 7.3 proved to be a good one, as the roadmapping action was carried out in cooperation with nine other EU-funded projects. From the point of view of the NESTOR project, the experience was good, and the cooperation went very smoothly. The expected benefits from the collaboration were reached and matched the expectations as explained in Section 6.2 above.

Another successful collaborative action was the membership of NESTOR in the BES Cluster of European projects. This cooperation enabled NESTOR to get acquainted with the member projects of the Cluster and to participate in the events organised by them.

Considering that NESTOR was a short project, the amount of collaboration with other projects was successful and it has fulfilled the expectations described in the DoA of the project.

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Appendix A: The questions of the survey

Survey of Standardisation Needs in the Area of Border Management

I Participant data

1. The participant's name
2. The participant's organisation
3. The country where the organisation is based
4. The type of participant's organisation
   - Practitioner
   - Authority / policy maker
   - Research institute
   - Industry
   - Non-governmental organisation
   - Other
5. The participant's email address

II Standardisation need

You have probably encountered situations, where you have hoped that there would be a standardised solution to an issue, or where necessary interoperability is missing. Please describe in this section a standardisation need that you have identified in your professional capacity; we will use it as input for the BM standardisation roadmap.

6. Give a name to this standardisation need
7. Choose the area to which this need is related
   - Border management processes
   - Technologies and systems
   - Interoperability and Integration
   - Communication
   - Personnel and their effort
   - Training and certification
   - Physical and cyber security
   - Functional safety and risk management
   - Privacy and data protection
   - Other
8. Describe the standardisation need
9. In which Border Management operational field does this need best fit?
   - 1 Irregular migration

- 2 Secure travel facilitation
- 3 Flow of goods and trade

10. If you chose 'Irregular migration' above, please choose a subtopic below
    - 1.1 Irregular border crossings
    - 1.2 Illegal stays
    - 1.3. Returns
11. If you chose 'Secure travel facilitation' above, please choose a subtopic below
    - 2.1. Identity of travellers & travel documents
    - 2.2. Serious cross-border health threats
    - 2.3. Flows of transportation means
12. If you chose 'Flow of goods and trade' above, please choose a subtopic below
    - 3.1. Effective trade management
    - 3.2. Counterfeit, illegal & dangerous goods and materials
    - 3.3. VAT / Fiscal fraud
13. What could the type of the standard be?
    - Terminology standard
    - Product standard
    - Service standard
    - Process standard
    - Interface standard
    - Testing standard
    - Quality standard
    - Training standard
14. How urgent is this need?
    - 1 (Extremely urgent) to 5 (Not urgent)

Appendix B: invitation to the workshop

Dear Border Management Stakeholder,

Welcome to join the Workshop on Border Management Standardisation Roadmap on Friday, 17 February 2023 (10:00-16:00 CET) at the CEN-CENELEC Meeting Centre in Brussels. The workshop will be organised as a hybrid event, and it can also be joined online through the Zoom tool.

The aim of the workshop is to identify and discuss standardisation needs in the border management domain, and to produce a preliminary roadmap for future standardisation activities. The workshop is intended to all stakeholders of border management, i.e. practitioners, national authorities, policy makers, industry and the research domain.

The workshop will be organised jointly by the CEN-CENELEC Sector Forum on Security (SF-SEC) and the NESTOR project in cooperation with nine other EU-funded projects. It will be moderated by [redacted], chairman of the SF-SEC and CEO of Woitsch Consulting, a partner in the NESTOR project. There is no participation fee for the workshop.

Agenda:

10:00 Opening of the workshop [redacted] *Woitsch Consulting)*

10:10 Welcoming words [redacted], *coordinator of the NESTOR project)*

10:15 Keynote speech: Security standardisation today [redacted], *Finnish Standards Association SFS)*

10:40 Keynote speech: Role of standards in the management of European borders [redacted] *FRONTEX)*

11:05 Refreshment break

11:20 Keynote speech: EU Civil Security Market and the role of security research [redacted], *DG HOME)*

11:45 Results of the Survey on standardisation needs in Border Management [redacted]

12:15 Lunch break

13:00 Group discussions addressing standardisation needs in three operational fields of Border Management

Group 1: Irregular migration – illegal border crossing, illegal stays, returns [redacted], *Center for Security Studies – KEMEA)*

Group 2: Regular border crossings – identities, documents, health threats, flow of transportation, flow of goods and trade, counterfeit, illegal goods *(*[redacted], *Center for Security Studies – KEMEA)*

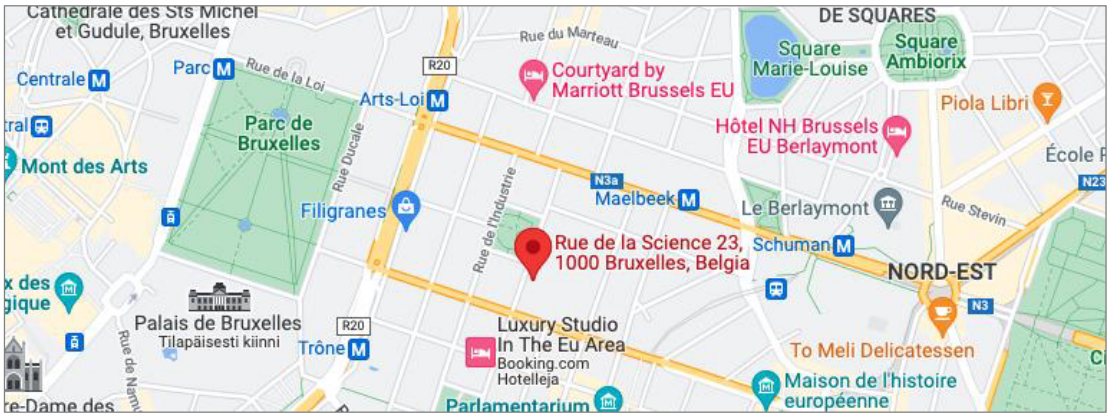
14:00 Refreshment break

14:20 Presentation of the results of the group discussions followed by a general discussion and a final panel discussion [redacted], *German Council on Foreign Relations)*

15:50 Closure of the workshop [redacted]

Practical information:

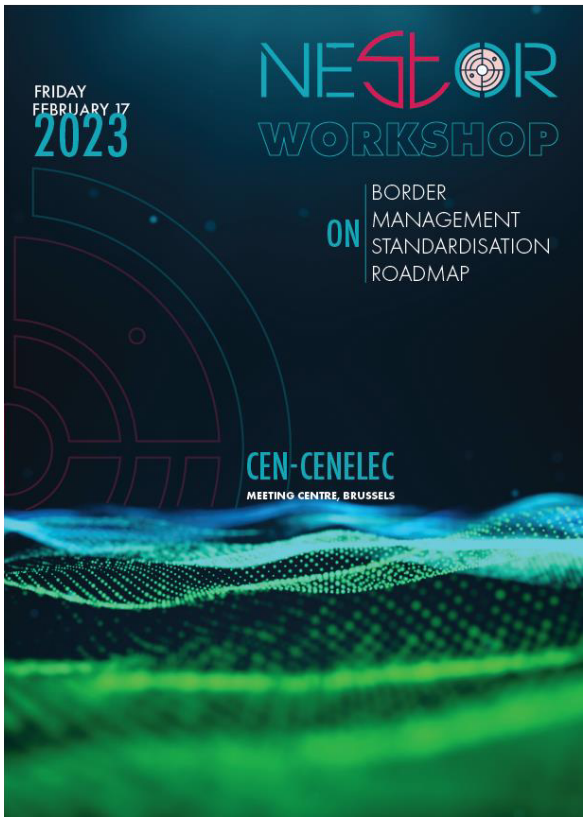
Date and time:	Friday, 17 February 2023 10:00–16:00 CET
Format:	Hybrid (onsite and online)
Onsite venue:	CEN-CENELEC Meeting Centre, Rue de la Science 23, Brussels, Belgium
Online tool:	Zoom (a link with instructions will be sent before the workshop)
Organisers:	CEN-CENELEC Sector Forum on Security (SF-SEC) – https://www.cencenelec.eu/areas-of-work/cen-sectors/defence-and-security-cen/sector-forum/ NESTOR project (funded by the European Union's Horizon 2020 research and innovation programme under GA No. 101021851) – https://nestor-project.eu/
Questions:	Please contact the organisers per email at workshop@woitsch.com



Participating projects:

Supporting organisations:

Appendix C: Communication material for the Standardisation workshop



Appendix D: Border Management Standardisation Roadmap

The Roadmap white paper is a public extract of this report. It will be disseminated to the participating projects, the identified stakeholders of Border Management Standardisation as well as to the participants of the Survey and the Workshop.

As the contents of the Roadmap document is rather long (44 pages) and all of its contents can be found in this report, we do not attach it as Appendix in this report. Instead, the public white paper "*Border Management Standardisation Roadmap*" can be downloaded from the NESTOR website at

https://nestor-project.eu/standardization-roadmap/.

Appendix E: Deliverable Quality Review Report

NESTOR Consortium uses this Quality Review Report process internally in order to assure the required and desired quality assurance for all project's deliverables and consequently the consistency and high standard for documented project results.

The Quality Review Report is used individually by each deliverable's peer reviewers with allocated time for the review to be 7 calendar days. The author of the document has the final responsibility to reply on the comments and suggestions of the peer reviewers and decide what changes are needed to the document and what actions have to be further undertaken.

1.1 Reviewers

Project Coordinator	HP -
Management Team Member	KEMEA -
Internal Peer Reviewers	MAG - , HP -

1.2 Overall Peer Review Result

The Deliverable is:

☐ Fully accepted

☒ Accepted with minor corrections, as suggested by the reviewers

☐ Rejected unless major corrections are applied, as suggested by the reviewers

1.3 Consolidated Comments of Quality Reviewers

General Comments	
Deliverable contents thoroughness	Reviewers' comment: Document of very good quality, please consider comment and revisions. References to the Standardization Roadmap document, which will be uploaded to the project's web site must be updated (currently they point to dropbox) before its submission. Author's reply:
Innovation level	Reviewers' comment: Author's reply:
Correspondence to project and programme objectives	Reviewers' comment: Author's reply:
Specific Comments	
Relevance with the objectives of the deliverable	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers' comment: Author's reply:
Completeness of the document according to its objectives	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers' comment:

	Author's reply:
Methodological framework soundness	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers' comment: Author's reply:
Quality of the results achieved	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers' comment: Author's reply:
Structure of the deliverable with clear objectives, methodology, implementation, results and conclusions	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers' comment: Author's reply:
Clarity and quality of presentation, language and format	☒ Yes ☐ No ☐ Partially ☐ Not applicable Reviewers' comment: Author's reply:

Detailed Comments (please add rows if needed)		
No.	**Reference**	**Remark(s)**
1		URL to Standardization Roadmap document to be updates.
2		Document header should be updated to the actual name of the document.
3		Revisions and comments to be taken into consideration.

Appendix F: Deliverable Ethics Review Report

Ethical and Legal Issues	Yes/No by Partner & EtAB comments (if needed)
General	
This deliverable includes the opinion/input of a DPO, Legal or Ethics Advisor.	**No** **EtAB comments:**
Human Participation in research activities (questionnaires, workshops, pilots or other research activities)	
This deliverable is based on research activities (questionnaires, workshops, pilots or other tasks) that involve human participants.	**Yes** **EtAB comments:** An online survey was conducted, and a hybrid workshop was organized in the framework of collecting data for the creation of the preliminary standardisation roadmap.
This deliverable is based on research activities (either during pilots or during the execution of other tasks) that may involve children or adults unable to give informed consent or vulnerable individuals/groups.	**No** **EtAB comments:**
Informed Consent Forms for the participation of humans in research have been/will be signed.	**Yes** **EtAB comments:** The Informed Consent procedure was followed for the registration and participation in the online survey and in the hybrid workshop.
Measures for the protection of vulnerable individuals/groups have been/will be implemented.	**N/A** **EtAB comments:**
Incidental findings, i.e. findings that are outside the research's scope, may be detected as part of the research activities described in this deliverable (criminal activity or personal data of non-volunteers during trials).	**No** **EtAB comments:**
Data Protection	
This deliverable is based on research activities that involve processing of personal data.	**Yes** **EtAB comments:**
This deliverable is based on research activities that involve processing of special categories of personal data according to Article 9 GDPR. Special categories of personal data means personal data revealing racial or ethnic origin, political opinions, religious or philosophical beliefs, or trade union membership, and the processing of genetic data, biometric data for the purpose of uniquely identifying a natural person, data concerning health or data concerning a natural person's sex life or sexual orientation).	**No** **EtAB comments:**
This deliverable is based on research activities that involve further processing of previously collected personal data or publicly available personal data.	**No** **EtAB comments:**
Informed Consent Forms for the personal data processing have been/will be signed and data subjects have been duly informed about their rights.	**Yes** **EtAB comments:** The Informed Consent procedure was followed for the processing of personal data as part of the registration and participation in the online survey and in the hybrid workshop.
The conditions for consent cannot be fulfilled. Another legal basis exists.	**No**

	EtAB comments:
This deliverable is based on research activities that involve transfer of personal data from/to non-EU/EEA countries (non-EU/EEA partners or advisory board members from non-EU/EEA countries) or processing of personal data during the use of platforms regulated by non-EU/EEA law.	**No** **EtAB comments:**
This deliverable implements appropriate technical measures that constitute safeguards (encryption or anonymisation or pseudonymisation).	**No** **EtAB comments:**
This deliverable implements other security measures for the prevention of unauthorized access to, unauthorized transfer of, loss or erasure of personal data.	**No** **EtAB comments:**
This deliverable is based on research activities that involve profiling of data subjects. Profiling means any form of automated processing of personal data consisting of the use of personal data to evaluate certain personal aspects relating to a natural person, in particular to analyse or predict aspects concerning that natural person's performance at work, economic situation, health, personal preferences, interests, reliability, behaviour, location or movements.	**No** **EtAB comments:**
Health and Safety procedures (for the staff and the participants in the pilots or other research activities)	
This deliverable refers to activities that may raise health and safety concerns (e.g. from the use of UAVs or from other risks during the pilots).	**No** **EtAB comments:**
This deliverable integrates the measures and mitigation actions presented in D8.5 EPQ-Requirement No.5.	**No** **EtAB comments:**
Dual use	
This deliverable refers to research activities that involve dual-use items in the sense of Regulation (EC) 428/2009, or other items for which an authorization is required.	**No** **EtAB comments:**
Potential misuse of the research findings	
This deliverable includes methodology, knowledge or references to tools and technologies that could be misused if they ended up in the wrong hands or could lead to discrimination and stigmatization of humans.	**No** **EtAB comments:**
This deliverable integrates the mitigation actions presented in D8.7 M-Requirement No.7.	**No** **EtAB comments:**