The Mechanisms of Prevention and Detection of CBRN Illegal Material Transfers Across Borders and Within the EU

Terrorism

Policy Department for Citizens' Rights and Constitutional Affairs
Directorate General for Internal Policies of the Union
PE 604.963 - April 2018
The Mechanisms of Prevention and Detection of CBRN Illegal Material Transfers Across Borders and Within the EU

STUDY

Abstract
This study, commissioned by the European Parliament’s Policy Department for Citizens’ Rights and Constitutional Affairs at the request of the Special Committee on Terrorism of the European Parliament (TERR), examines the challenges pertaining to CBRN illicit trafficking that the European Union faces. Taking into account the new October 2017 CBRN Action Plan as well as existing mechanisms and solutions, it focuses on means to prevent and detect the introduction into and movement within the Union territory.
ABOUT THE PUBLICATION

This research paper was requested by the European Parliament’s Committee on Constitutional Affairs and was commissioned, overseen and published by the Policy Department for Citizens’ Rights and Constitutional Affairs.

Policy Departments provide independent expertise, both in-house and externally, to support European Parliament committees and other parliamentary bodies in shaping legislation and exercising democratic scrutiny over EU external and internal policies.

To contact the Policy Department for Citizens’ Rights and Constitutional Affairs or to subscribe to its newsletter please write to: poldep-citizens@europarl.europa.eu

RESPONSIBLE RESEARCH ADMINISTRATOR

Eeva ERIKSSON
Policy Department for Citizens' Rights and Constitutional Affairs
European Parliament
B-1047 Brussels
E-mail: poldep-citizens@europarl.europa.eu

AUTHORS

Dr. Claude WACHTEL, Independent Consultant, Associate Senior Research Fellow, Fondation pour la Recherche Strategique (FRS)
Dr. Elisande NEXON, Senior Research Fellow, Fondation pour la Recherche Strategique (FRS)

LINGUISTIC VERSION

Original: EN
Manuscript completed in April 2018
© European Union, 2018

This document is available on the Internet at:
http://www.europarl.europa.eu/supporting-analyses

DISCLAIMER

The opinions expressed in this document are the sole responsibility of the author and do not necessarily represent the official position of the European Parliament.

Reproduction and translation for non-commercial purposes are authorised, provided the source is acknowledged and the publisher is given prior notice and sent a copy.
CONTENTS

1. ILLICIT TRAFFICKING AND CBRN PROLIFERATION AND TERRORISM 9
   1.1. Increasing threats 9
   1.2. The dual-use dilemma 10
   1.3. Modus operandi and actors responsible for CBRN trafficking 10

2. CHALLENGES RAISED BY CBRN ILLICIT TRAFFICKING AND RESPONSE AT THE EUROPEAN LEVEL 12
   2.1. Specificities of CBRN material and challenges 12
   2.2. The functions contributing to the prevention and detection of CBRN agent transfers 13
   2.3. The role played by the European Union 14
   2.4. The main actors involved at EU level 14
   2.5. The European CBRN Action Plans 15

3. PREVENTING THE INTRODUCTION INTO OR MOVEMENT OF CBRN MATERIALS WITHIN THE EU 16
   3.1. Promoting multilateralism 16
   3.2. Strengthening capacities of third countries through cooperation: the EU CBRN Centres of Excellence (CoE) initiative and the EU P2P export control programme 17
   3.3. Export controls of CBRN dual-use items (exports, transit, transshipment and re-export of dual use goods) 18
   3.4. Physical protection of research, production, storage and trading infrastructures 19
   3.5. Protection of transport against attacks and theft 19
   3.6. Promoting research and innovation 20

4. DETECTING ILLICIT INTRODUCTION AND MOVEMENT IN THE EU 21
   4.1. Ongoing threat surveillance and identification of weak signals and alerts 21
      4.1.1. Ongoing monitoring of threats 21
      4.1.2. Early warning systems regarding human and animal health and the food chain 21
   4.2. Operational detection at the EU borders and within the Union 22
      4.2.1. Operational nuclear and radiological detection 23
      4.2.2. Operational chemical and biological detection 23
      4.2.3. Operational detection R&D 24
   4.3. Laboratory analyses of chemical and biological agents 25
4.4. The organization of laboratories

4.5. The forensic capacity with regards to suspicious agents and materials seized by the authorities

4.6. The ability to assist authorities in the event of searches or preventive operations that may lead to the discovery of CBRN agents (trafficking, etc.)

5. TOWARDS A COMMON STRATEGY TO PREVENT AND CONTROL THE INTRODUCTION OF CBRN AGENTS INTO THE EUROPEAN UNION

5.1. A positive assessment of the EU’s Action Plan and the enactment of the complementary programme

5.2. Towards a European-scale integrated system for the control and detection of illegal movements of CBRN agents, products and equipment

5.3. The control of transactions pertaining to agents that might be used for illicit purposes

5.4. Securing transfers of highly pathogenic biological agents from a Member State to another

5.5. Aiming at a European capacity to connect several alerts of different natures in order to detect suspicious traffics at an early stage

5.6. Strengthening the surveillance capacity at borders

5.7. Aiming at an extended cooperation between laboratories

6. ULTIMATE PURPOSE: STRENGTHENING THE CHAIN OF CBRN DETECTION AND CONTROL MECHANISMS

REFERENCES
LIST OF ABBREVIATIONS

AESA  European Aviation Security Agency
ARGUS  General Rapid Alert System of the European Commission
AU  Australia Group
BTWC  Biological and Toxin Weapons Convention
CBRN  Chemical, Biological, Radiological, Nuclear
CoE  Centres of Excellence
CWC  Chemical Weapons Convention
EBDS  European Bomb Data System
EC  European Council
ECDC  European Centre for Disease Control and Prevention
ECURIE  European Community Urgent Radiological Information Exchange
EDA  European Defence Agency
EEAS  European External Action Service
EMCP  European Mechanism of Civil Protection
EMERGE  Efficient response to highly dangerous and emerging pathogens at EU level
EU  European Union
EU INTCEN  EU Intelligence Analysis Centre
EUSECTRA  European Nuclear Security Training Centre
EWRS  Early Warning and Response System
FP7  Seventh Framework Programme
GC  Gas chromatography
H2020  Horizon 2020 (EU Research and Innovation programme)
IAEA  International Atomic Energy Agency  
ICSP  EU Instrument Contributing to Security and Peace  
ISEC  Prevention of and Fight against Crime programme  
JRC  Joint Research Centre  
LC  Liquid chromatography  
MST  Muons Scattering Tomography  
NMR  Nuclear Magnetic Resonance  
NPT  Nuclear Non-Proliferation Treaty  
NSDDP  Nuclear Smuggling Detection and Deterrence Program  
NSG  Nuclear Suppliers Group or Next Generation Sequencing  
RAPEX  System for the Rapid Exchange of information  
RAS-BICHAT  Rapid Alert System Task force on Biological and Chemical Agent Attack  
RAS-CHEM  Rapid Alert System for Chemical Incidents  
RASFF  Rapid Alert System for Food and Feed  
R&D  Research and Development  
SNM  Special Nuclear Material  
TEU  Treaty of European Union  
UN  United Nations  
UNODA  United Nations Office for Disarmament Affairs  
USA  United States of America  
WMD  Weapons of mass destruction
LIST OF TABLES

TABLE 1
Telling examples of events reported by the press 10

TABLE 2
Circumstances leading to the detection of CBRN illicit trafficking 11

TABLE 3
A comprehensive and consistent set of functions to prevent, detect and disrupt illicit trafficking 13

TABLE 4
Principles governing the EU CBRN Centres of Excellence initiative 18

TABLE 5
The European Union’s main public health alert systems 22

TABLE 6
Significant national and EU-funded initiatives pertaining to the organization of laboratories 27

TABLE 7
A comprehensive and consistent set of functions to prevent, detect and disrupt illicit trafficking 30
EXECUTIVE SUMMARY

Illicit transfers of chemical, biological, radiological and nuclear (CBRN) materials or products with malevolent intentions, as well as their criminal or terrorist use, have been effective and considerably increased since the turn of the century. The context is characterized by increasing flows of travellers and goods, with an intensification of international exchanges, coupled with a greater diffusion of technologies and know-how. Illicit trafficking patterns and dynamics are affected by circumstances. Operations involve a number of actors that may vary depending on the CBRN agent involved. They range from producers to end-users and include brokers and intermediaries.

Preventing and detecting the introduction of CBRN agents or materials into the European Union (EU) and/or their movement within the Member States raises challenges. The very nature of the four types of CBRN agents account for a major problem in the prevention and management of illicit traffics and transfers, as they entail different risks and challenges, including technological ones. In addition to difficulties connected with the present technological limitations of detection devices, other factors complicate the actions aimed at detecting the introduction of CBRN agents and products in the EU and preventing their circulation, including the number of land, maritime, and aerial entry points or the heterogeneity in the border and customs mechanisms deployed by the Member States.

Since the early 2000s, the EU has adopted a number of strategies that address, among other priorities, challenges pertaining to CBRN illicit trafficking, the last one being the 2016 Global Strategy for the EU’s foreign and security policy: "Shared Vision, Common Action: A Stronger Europe". In 2009, the Commission also adopted a CBRN Action comprising 124 actions. It aimed to strengthen security against CBRN risks and threats throughout the EU. Building upon its results, a new plan to enhance preparedness against chemical, biological, radiological and nuclear security risks was submitted to the European Parliament and to the Council in 2017. Taking into account evolving and emerging threats, it seeks to address the gaps identified in the implementation of the previous plan.

The measures taken in the CBRN field by the EU for more than ten years, notably regarding the steps taken to reduce the risks of introduction of CBRN agents, products or equipment into the EU and/or of their circulation between the Member States, adequately supplemented the actions taken on by each State. However, the Member States’ approaches are very heterogeneous, and, actually, few of them have the capacity to carry out all the functions contributing to the control and detection of CBRN illicit trafficking. Be that as it may, the EU as a whole possesses know-how, technology and means which may enable the set-up of an efficient integrated system, based on a comprehensive and consistent set of functions.
1. ILLICIT TRAFFICKING AND CBRN PROLIFERATION AND TERRORISM

1.1. Increasing threats

Illicit transfers of chemical, biological, radiological, nuclear (CBRN) materials and products with malevolent intentions, and their criminal or terrorist use, have been effective and considerably increased since the turn of the century. The reality of such transfers and smuggling may eventually aim at carrying out the assassination of key figures, executing terrorist attacks, as well as contributing to the development of programmes of weapons of mass destruction. Transfers may not only involve CBRN ready-to-use material, but also precursors, as well as laboratory, production, transportation and storage equipment.

The context is characterised by increasing flows of travellers and goods, with an intensification of international exchanges. There is also a greater diffusion of technologies and know-how. Thus, the impact of scientific and technical advances must be taken into account for threat assessment as they may lower the threshold for the proliferation of weapons of mass destruction, while fostering the development of solutions for prevention, detection and response.

Lately, the repeated use of chemical weapons in Syria and Iraq has highlighted the chemical threat, and, when considering a potential non-conventional terrorist attack, the most likely modus operandi that is expected is the use of chemical agents. However, this does not preclude the possibility to have to face another entirely different kind of scenario involving a biological, radiological or even nuclear dimension.
Table 1: Telling examples of events reported by the press

- In June 1994 and March 1995, the sarin terrorist attacks in Matsumoto, and in a tube station in Tokyo, made the public aware of the feasibility of such attacks leading to thousands of people requiring treatment in hospitals;

- In 2001, in the United States, spores of *Bacillus anthracis* enclosed in envelopes largely disrupted emergency services throughout the world due to numerous alerts and showed the lethal potential of a biological weapon, even though it had been used in tiny quantities;

- In the nineties and until the turn of the millennium, Ahmed Khan, one of the initiators of the Pakistani nuclear programme, sold know-how and technology to North Korea, Iran and Libya, mainly for his own profit. Thus, he showed that such trade is a possibility;

- Between 2014 and 2016, the terrorist organisation Daesh made and used mustard gas, as well as chlorine, on the battlefields of Syria and Iraq, causing fear of chemical attacks in the enemy countries it targets, especially in Europe.

The EU has also fallen victim to similar events:

- Attributed to the Russian perpetrators, the introduction in the United Kingdom of rare chemical and radioactive products with homicidal intent (radioactive 210 polonium in 2003 and ill-known toxic chemical agent in 2018);

- Several cases of nuclear smuggling detected, especially in the Black Sea region (e.g. in Moldova).

1.2. The dual-use dilemma

Most CBRN material and equipment have peaceful industrial, domestic or research applications and can be legally acquired, with due regard to pertaining regulations. However, at this time, they can be misused by either state or non-state actors to develop weapons. Dual-use items, including in the CBRN field, makes reference to goods, software and technology that can be used for both civilian and military applications, and may be used for the development of weapons of mass destruction and for terrorist attacks, as well as for criminal activities. The dual use dimension creates challenges in term of control.

1.3. Modus operandi and actors responsible for CBRN trafficking

The introduction of CBRN agents or material into the EU and their movement within the Member States can be achieved through various channels. Each possibility requires specific countermeasures from national authorities and at European level:

- The entrance and movement within the EU of individuals conveying CBRN material or equipment aimed at producing them;

- The purchase on the European market of material and equipment sold over the counter and that can be used to make CBRN agents by ill-intended people;
• The theft or diversion of CBRN agents or material, or their precursors (e.g. biological agents from research laboratories, radioactive sources from hospitals, or bulk chemicals from industrials sites);

• The illegal acquisition of dual-use equipment enabling to produce, transport, store or use CBRN agents or material that may normally be submitted to authorized use;

• The delivery in the EU of CBRN agents, material or equipment mainly ordered through the internet from countries which trade them without any control while their purchase is under strict control in Europe;

• The resort to smuggling channels (e.g. snake venom supposed to be sold to laboratories, nuclear material);

• The ill-intended collection of infectious biological agents that can be found in nature.

Table 2: Circumstances leading to the detection of CBRN illicit trafficking

<table>
<thead>
<tr>
<th>Authorities can be made aware of CBRN material illicit trafficking:</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Through information collected by the police or intelligence services regarding the possible or confirmed presence of CBRN material aimed at trafficking or malevolent action in the EU;</td>
</tr>
<tr>
<td>• Thanks to technical means of detection, or either police or customs border (land, sea, air) controls;</td>
</tr>
<tr>
<td>• By the discovery of a specific product on the EU territory either by chance, or following a security search or an investigation;</td>
</tr>
<tr>
<td>• After the declaration from an industrial company, a hospital or a research laboratory reporting about a theft involving CBRN material;</td>
</tr>
<tr>
<td>• And ultimately by the consequences of its malevolent use (terrorist attacks or attempts, homicides…).</td>
</tr>
</tbody>
</table>
2. CHALLENGES RAISED BY CBRN ILLICIT TRAFFICKING AND RESPONSE AT THE EUROPEAN LEVEL

2.1. Specificities of CBRN material and challenges

The very nature of the four types of CBRN agents account for a major problem in the prevention and management of illicit traffics and transfers, as they entail different risks and challenges, including technological ones. Analysis of known cases show that supply-demand dynamics and actors involved in illicit trafficking may differ depending on the nature of the CBRN material. A number of elements can characterize an illicit trafficking operation, including the source or manufacturer of the product, brokers and intermediaries, the end-user, logistical chain and financial transactions. Illicit trafficking patterns and dynamics may obviously be affected by circumstances. For instance, changing trends in nuclear smuggling in Eastern Europe have been linked with the ongoing crisis in Ukraine and the instability in some neighbouring countries.

In addition to difficulties connected with the present technological limitations of detection devices, other factors complicate the actions aiming at detecting the introduction in the EU and preventing the circulation of CBRN agents and products:

- The volumes of flows to be controlled at entry points are huge, involving travellers and their luggage, freight, postal or other shipments, and vehicles of all sorts. The number of land, maritime and aerial entry points is also significant;

- There is a high heterogeneity in the border and customs mechanisms deployed by the Member States;

- The quantity of CBRN agents needed to get significant impact may be very small, which makes their concealment easier.

Weapons-grade nuclear materials that can provide the core of nuclear weapons is strictly controlled. However, the possibility that terrorists might acquire this type of material cannot be ruled out, and nuclear threat by non-state actors has to be taken into account. Nuclear materials emit different types of radioactive particles, including alpha, beta and gamma radiations as well as neutrons. However, some of the most dangerous materials only emit limited amounts of radiations. Alpha and beta particles are respectively shielded by a simple sheet of paper and a few millimeters of aluminium, whereas gamma rays are blocked by a thick shield of dense material such as lead, bricks of concrete and neutron radiations by substantial quantities of water, fuel, or plastic. Low levels of spontaneous emission of penetrating radiation and deliberate shielding thus make the detection challenging. However a container adequately protecting nuclear materials and preventing gamma rays detection would be heavy and cumbersome which would make it visible and therefore suspicious in case of X-rayed controls.

Radiological agents also emitting radioactivity are widely spread because of their numerous industrial and medical applications. Nevertheless, they have the potential to be misused to manufacture "dirty bombs" where the explosion scatters radiological material. Even if the radioactive element is tiny, its radioactivity may be very strong. The usual N and R detection devices may raise a doubt about a closed parcel so long as the agent itself is not enough shielded. If there is radiation shielding, the resulting unusual weight could raise suspicions.
Toxic chemicals, many of which have legitimate industrial and domestic applications, are numerous, which raises problems in terms of control, identification on the ground and testing. While the number of so-called “chemical warfare agents” is limited, many others chemical products can be misused. Furthermore, as long as they are stored strictly in a leak-proof outwardly clean container, they may be presently regarded as nearly undetectable.

The same goes for biological infectious agents, all the more so as synthetic biology henceforth opens the door to genetic engineering, infinitely multiplying the potential characteristics of such agents and enabling the de novo creation of pathogens. In addition, biological toxins are non-replicative and non-infectious toxic substances secreted by living organisms (bacteria, fungi, protozoa, insects, animals or plants). Very small quantities may be lethal, and they have already been used for criminal actions (e.g. the poisoning by ricin of an opponent by Bulgarian secret services in 1978, using an umbrella fitted with a needle).

2.2. The functions contributing to the prevention and detection of CBRN agent transfers

As mentioned in Chapter 1, the detection of CBRN material and agents, still a R&D domain in full growth, does not ascertain the ability to identify all the movements and trafficking of CBRN agents at the European borders and between Member States. While important, this limitation does not rule out detection and control processes, as they are not limited to technological detection of agents, but covers a much wider range of functions enabling to prevent and/or identify illegal movements of CBRN agents. Therefore, in order to secure their efficiency regarding the circulation of CBRN agents, material and equipment, they must be part of a comprehensive procedure.

Table 3: A comprehensive and consistent set of functions to prevent, detect and disrupt illicit trafficking

<table>
<thead>
<tr>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A permanent ongoing prevention:</td>
</tr>
<tr>
<td>• Upstream, supporting of countries outside the EU;</td>
</tr>
<tr>
<td>• Regulating and monitoring of the agents, material or equipment that could be used in CBRN acts;</td>
</tr>
<tr>
<td>• Protecting the research, production, storage and trading facilities as well as the means of transport;</td>
</tr>
<tr>
<td>An ongoing monitoring of threats and identification of weak signals and alerts;</td>
</tr>
<tr>
<td>Operational detection at EU borders, including at entry points, or within the EU;</td>
</tr>
<tr>
<td>The strengthening of the alert posture in the context of a pre-alert;</td>
</tr>
<tr>
<td>The search for the agent (e.g. search of premises, collection of samples);</td>
</tr>
<tr>
<td>Laboratory tests and procedures;</td>
</tr>
<tr>
<td>Preventive actions of specially trained anti-terrorist units;</td>
</tr>
<tr>
<td>The criminal and technical investigations to identify the source of the events (forensics);</td>
</tr>
<tr>
<td>The information of the actors, their training and the joint exercises;</td>
</tr>
<tr>
<td>Lessons learned process.</td>
</tr>
</tbody>
</table>

Other EU actions, the scope of which is broader than the prevention and fight against CBRN illicit trafficking, can also complement these functions. They include for example measures that aim at tackling terrorist financing.
2.3. **The role played by the European Union**

The Treaty on European Union (Article 4(2) TEU)\(^1\) provides that “national security remains the sole responsibility of each Member State” and, accordingly, each of them has to take and implement the appropriate measures to ensure their internal and external security. Thus, in the field of security, the EU’s part consists in bringing specific European support to strengthen the Member States’ action without encroaching on their sovereignty in that area.

Article 67 (3) TEU states that “the Union shall endeavour to ensure a high level of security through measures to prevent and combat crime, racism and xenophobia, and through measures for coordination and cooperation between police and judicial authorities and other competent authorities, as well as through the mutual recognition of judgments in criminal matters and, if necessary, through the approximation of criminal laws”. Furthermore, the EU part can also involve supporting the coordination and sharing of national response systems as is the case of the European Mechanism for Civil Protection (EMCP). It derives part of its legitimacy from the solidarity clause which declares that a Member State which detains response capacities must support another State dealing with a terrorist threat and unable to face it all by itself. These provisions highlight the notion of added value brought about by the EU.

Regarding the fight against crime and terrorism, the European Agenda on Security (COM (2015) 185 final)\(^2\) provides the main policy framework for the Union’s action and focuses on strengthening the information exchange, increasing the operational cooperation, and providing support in training, funding, research and innovation.

2.4. **The main actors involved at EU level**

In the EU, in addition to the Member States themselves, several Commission Directorates-Generals (notably DG Migration and Home Affairs, DG Research and Innovation and DG Trade) and the European External Action Service (EEAS), as well as a number of European agencies and entities, somehow are involved in the functions referred to in Point 2.2. The below list is not exhaustive:

- The Commission’s CBRN Advisory Group which animates and coordinates the various initiatives taken in the EU, especially through its Action Plans;
- The EU Intelligence Analysis Centre (EU INTCEN) which provides in-depth analyses based on intelligence provided by Member States;
- The European Union Agency for Law Enforcement Cooperation Europol’s European Office which forwards intelligence about criminal actions to the police services of the Member States sand has access to data bases in that field;
- Eurojust, the European Union’s Judicial Cooperation Unit which initiated the possibility of common inquiry teams, regarding terrorism in particular. Its functioning relies on direct relationships between the judicial authorities of the Member States;
- The European Border and Coast Guard Agency (FRONTEX);
- The Joint Research Centre which carries out research in order to provide independent scientific advice and support to EU policy;
- The European Union CBRN Centres of Excellence (CoE);
- The European Defence Agency (EDA);

---

- The European Atomic Energy Community (Euratom), governed by the European Commission and Council, and operating under the jurisdiction of the European Court of Justice;
- The European Aviation Security Agency (AESA) founded in 2003 in the post 11/9 context, which notably imposed common luggage control standards.

Alternatively, the EU Civil Protection Mechanism, if required, can coordinate the distribution of the Member States’ CBRN operational modules, some of which can be used for on-site analysis when suspicious material has been discovered.

2.5. **The European CBRN Action Plans**

In 2009, following a report from a CBRN Task Force, the Commission presented a Communication on strengthening CBRN security in the EU, with an Action Plan³. Aiming to strengthen security against CBRN risks and threats throughout the EU, its implementation was a key part of the EU Internal Security Strategy in Action⁴. A CBRN advisory group was established in 2010. Building upon the outcomes of the 2010–2015 plan, a new plan to enhance preparedness against chemical, biological, radiological and nuclear security risks was submitted to the European Parliament and to the Council in 2017⁵. Taking into account evolving and emerging threats, it seeks to address the gaps identified in the implementation of the previous plan.

---

3. PREVENTING THE INTRODUCTION INTO OR MOVEMENT OF CBRN MATERIALS WITHIN THE EU

3.1. Promoting multilateralism

The European Council adopted on 12 December 2003 the European Security Strategy\(^6\), in parallel with the adoption of the EU Strategy against the proliferation of weapons of mass destruction (WMD)\(^7\), followed in 2008 by new lines for action on WMD proliferation. One of the principles enshrined in the WMD strategy and that determines EU action is effective multilateralism and strengthening international non-proliferation mechanisms. The Council adopted in 2005 the EU counter-terrorism strategy to fight terrorism globally and make Europe safer\(^8\). Focusing on four pillars (prevent, protect, pursue and respond), it recognizes the importance of cooperation with international and regional institutions, and third countries.

At last, in June 2016, the Commission presented its new Global Strategy for the EU's foreign and security policy: "Shared Vision, Common Action: A Stronger Europe\(^9\). It states, “the EU will strive for a strong UN as the bedrock of the multilateral rules-based order, and develop globally coordinated responses with international and regional organisations, states and non-state actors". It also provides that “the EU will strongly support the expanding membership, universalisation, full implementation and enforcement of multilateral disarmament, non-proliferation and arms control treaties and regimes. We will use every means at our disposal to assist in resolving proliferation crises, […]”. In the last chapter “From vision to action”, it stresses the need to improve the monitoring and control of flows which have security implications and lists a number of objectives including, among others, investments in detection capabilities and the cross-border tracing of weapons, but it does not specifically mention CBRN threats in this respect.

The international legal framework relevant for preventing and fighting illicit CBRN trafficking encompasses instruments that address the protection of CBRN material and related infrastructures, the monitoring of cross-border movements of CBRN materials, as well as the need for Member States to adopt measures to prevent illicit trafficking. They include\(^10\):

- The Treaty on the Non-Proliferation of Nuclear Weapons (1968);
- The Convention on the Physical Protection of Nuclear Material (1979);
- The International Convention for the Suppression of Acts of Nuclear Terrorism (2005);
- The Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons and on their Destruction (1972);
- The Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction (1993);

---

\(^6\) [https://europa.eu/globalstrategy/fr/node/13](https://europa.eu/globalstrategy/fr/node/13)


The EU supports the implementation of these instruments. UN Security Council Resolution 1540 (2004) specifically requires the States to adopt a series of measures, including ones pertaining to accountability and security of related material in production, use, storage or transport, physical protection, border controls, national export and trans-shipment controls. All EU Member States co-sponsored UN Security Council Resolution 2325 (2016). Through several joint actions, the EU funded the United Nations Office for Disarmament Affairs (UNODA), responsible for providing the 1540 Committee with substantive and logistical support. In the past few years, the EEAS also carried out a targeted outreach toward 17 Member States that still had to submit a first report to the 1540 Committee, mobilising the network of EU Delegations.

The EU similarly provides financial support to the Biological and Chemical Weapons Conventions, through a series of action plans, Council Decisions and Joint Actions. It is allocated from the Common Foreign and Security Policy (CFSP) budget. The EU also supports the Global Partnership against the spread of WMD, having committed more than EUR 950 million since it was launched.

3.2. Strengthening capacities of third countries through cooperation: the EU CBRN Centres of Excellence (CoE) initiative and the EU P2P export control programme

The major CoE initiative\(^{11}\) was launched by the EU in 2010. It aims essentially at reducing the risks of CBRN material illegal transfers from or through third countries, as well as facing events involving CBRN products. Their cause may be malevolent (theft, traffics, proliferation), accidental (industrial facilities), or natural (epidemics). The funding comes from the EU Instrument Contributing to Security and Peace (IcSP)\(^{12}\).

In total, 59 countries are involved in those Centres of Excellence within and outside the EU. Supported by EU experts, those centres are supposed to achieve an inventory of the situation as well as even if this training, planning and organization actions in order to facilitate national governance and improve legislation. The initiative also aims at imposing standards and safety procedures to strengthen the security along borders, and so on. Ultimately, each of those countries should manage by itself. Avoiding a top-down approach, the initiative is based on partnerships and seek to conjure local dynamics that could be boosted by seminars and training sessions.

Eight regions have been identified. A significant number of countries from the African Atlantic Façade, the Eastern and Central Africa and the North Africa and Sahel regions are for instance involved in the initiative (e.g. Morocco, Gabon, Algeria, Burkina Faso, Mali, Mauritania, Niger, and Tunisia). The Sahel and Sahara areas where there are still terrorists groups actually cause particular preoccupation, as they are in the vicinity of places where chemical weapons may have been stored, or of countries where there are coveted raw products (uranium for instance). Other regions include South East and Eastern Europe, Middle East, Central Asia, South East Asia and Gulf Cooperation Council Countries.

\(^{11}\)http://www.cbrn-coe.eu

Table 4: Principles governing the EU CBRN Centres of Excellence initiative

- Networking, regional and international partnerships, consolidating, coordinating and optimising existing capabilities in terms of expertise, training, technical assistance or equipment.

- Addressing regional CBRN needs through specific tailored projects in fields of concern such as: protection of CBRN material/facilities, public and infrastructure protection, denying support for CBRN misuse and terrorism, border control/border monitoring, export control, transit and trans-shipment control, safeguarding CBRN information diffusion, bio-safety/bio-security, illicit trafficking, CBRN waste management, first response, public health impact mitigation, post incident recovery, investigation and prosecution, crisis response.

- Strengthening a regional culture of safety and security by increasing local ownership, local expertise and long-term sustainability.

- Institutional capacity building at regional and national levels; reinforcing of national CBRN policy, improving of institutional capacities in legal, regulatory, control, scientific/technical support and law enforcement domains.

- Promoting a coherent interagency approach to enhance coordination and effective response.

- Enhancing cooperation with international organisations and EU member states to ensure synergy and avoid duplication of efforts.

- Enhancing coherence and visibility of the EU action.

Source: http://www.unicri.it/topics/cbrn/coe/

There are currently 65 projects funded in the framework of the CoE initiative, some of them directly related to the prevention and detection of illicit CBRN trafficking (e.g. Project 64 “EU P2P - Export Control Programme for dual use goods 2017”, Project 55 “Strengthening cross-border capacity for control and detection of CBRN substances”).

Funded under the EU CBRN Centres of Excellence initiative, the EU P2P (partner-to-partner) - Export Control Programme for dual use goods\(^{13}\), previously known as the EU Outreach in Export Control programme, focuses on legal, licensing, customs, enforcement and sanctions issues. Experts from export control agencies of several Member States implement this programme.

### 3.3. Export controls of CBRN dual-use items (exports, transit, transshipment and re-export of dual use goods)

According to the new 2016 Global Strategy, “the EU will actively participate in export control regimes, strengthen common rules governing Member States’ export policies of military – including dual-use –

\(^{13}\) [https://exportcontrol.jrc.ec.europa.eu/](https://exportcontrol.jrc.ec.europa.eu/)
equipment and technologies, and support export control authorities in third countries and technical bodies that sustain arms control regimes.\textsuperscript{14}

The EU export control regime is governed by Council Regulation (EC) No 428/2009 of 5 May 2009 setting up a Community regime for the control of exports, transfer, brokering and transit of dual-use items. It seeks to control the export, transit and brokering of European dual-use items according to international regulations such as the Nuclear Non-Proliferation Treaty (NPT), the Biological and Toxin Weapons Convention (BTWC), the Chemical Weapons Convention (CWC) and Resolution 1540 (2004). It provides common EU control rules, a common list of dual-use items as well as coordination and cooperation to support the consistent implementation and enforcement of dual-use trade controls throughout the Union. The EU list of controlled items is based on control lists adopted by several non-binding informal multilateral export control regimes, including the Australia Group (AG) and the Nuclear Suppliers Group (NSG).

Except for some sensitive items, dual-use goods are traded freely within the EU. An export authorisation is required to export outside the EU customs territory dual-use items listed in the EU control list and non-listed items under the so-called catch-all clause. Other items may also be banned if, for example, there are suspicions that they will be used in connection with a biological, chemical, nuclear weapons or ballistic missile weapons programme, or in violation of an arms embargo. Member States may also impose extra controls over non-listed dual-use items due to public security or human rights considerations. Additional restrictive measures apply to the trade with Iran, North Korea and Syria.

The export control regime is currently under review. It must indeed be regularly updated to take into account the evolution of the security environment, scientific and technological developments, as well as changes in world trade.

3.4. Physical protection of research, production, storage and trading infrastructures

The protection of critical infrastructures, initially limited to those a country could not dispense with, has now expanded in several countries and encompasses facilities which create risks for the population, including those handling dangerous material. Protecting infrastructures is required under UN Resolution 1540 (2004). For example, France has developed a guide for operators to enhance the security of industrial installations handling hazardous chemicals, with a view to prevent malevolent acts. It has already been widely distributed in cooperation with the Union française des industries chimiques, the main professional organization in this field. It addresses among other topics the prevention of incursions on sites where thefts of hazardous material could occur.

This field is developing with the framework provided by the European Reference Network for Critical Infrastructure Protection (ERNCIP) coordinated by the Joint Research Centre (JRC). One should also highlight the fact that the EU has established a European Nuclear Security Training Centre (EUSECTRA). Located in the Joint Research Centre (in Ispra and Karlsruhe), it is tasked with teaching good practices to prevent thefts and fight criminal actions and traffics. As it is also intended to train trainers, it enables trainees to handle genuine nuclear material.

3.5. Protection of transport against attacks and theft

In the various EU countries using atomic energy, the transport of nuclear material is secure. A special effort is made to locate in real time vehicles or convoys carrying dangerous goods that may be hijacked

or stolen. As for the most sensitive transfers of biological agents, they are subject to a special security procedure in a number of Member States.

Considering the means of transport for CBRN material, it is worth noticing the work of the EU on the satellite-assisted location of the fleets of vehicles transporting sensitive and or dangerous material. Thanks to this practice, responders are rapidly aware of theft, for example of a lorry, and can guide the security forces in charge of its interception and recovery.

3.6. Promoting research and innovation

Under the Seventh Framework Programme for Research and Technological Development (FP7 2007–2013), about EUR 200 million were allocated to CBRN-related activities and more than 50 projects were funded. The current Framework Programme for research and innovation, Horizon 2020 (H2020 2014–2020), is the biggest EU Research and Innovation programme ever with nearly EUR 80 billion of funding available over seven years. It puts the emphasis on excellent science, industrial leadership and tackling societal challenges. Some topics from the “Secure societies – Protecting freedom and security of Europe and its citizens” involve a CBRN component. For example, in the Horizon 2020 work programme 2018–2020, a sub-topic focuses on “Detecting threats in the stream of commerce without disrupting business” and the fight against illicit trafficking of radioactive and nuclear materials (including through the establishment of a trans-European network of detection facilities with its specific concept of operations) is considered as particularly relevant.
4. DETECTING ILLICIT INTRODUCTION AND MOVEMENT IN THE EU

4.1. Ongoing threat surveillance and identification of weak signals and alerts

4.1.1. Ongoing monitoring of threats

The ongoing monitoring aims at:

- Detecting signals showing a flaw likely to give rise to unlawful transfers of CBRN products (for instance sales proposals of uncontrolled toxic products on the internet) or the existence of a prospect or a current action to introduce or convey a CBRN product on the Union territory;

- Creating a database of noteworthy incidents and events enabling later cross-checking’s when a matter of illegal circulation happens. This database can also be referred to regarding practical responses to incidents.

The challenge of this monitoring is to gather in one database very different kinds of information which are not always connected: for example, information from intelligence services or from police (for example breaking into a laboratory, gap in stock checking at a chemical plant, poisoning crime, suspicious product during an inquiry following an attempt of use), information from a human, animal health or food control network, and information on interventions from emergency teams.

This idea is gaining ground, mainly within Europol’s framework. Starting as of 2018, CBRN events should be more systematically recorded in the European Bomb Data System (EBDS) – which also collects information about explosives and cobbled up devices, and in the Schengen database. The EBDS should facilitate the identification of weak signals and thus contribute to preventing illegal imports or transportation in Europe. Since 2012, this base has been efficiently supplemented by the Commission’s electronic system about dual-use goods, which enables the Member States to share intelligence about rejected exports of equipment that could be used to make CBRN weapons. Likewise, the Commission is planning to integrate data from the International Atomic Energy Agency (IAEA) concerning the incidents, thefts and traffics in the nuclear and radiological sectors.

4.1.2. Early warning systems regarding human and animal health and the food chain

Signals can come from warning systems relating to human or animal health or food security, particularly when the containers of the CBRN material have been spoiled. In addition, smugglers or terrorists may have been contaminated by their own CBRN goods.

In 2013, after the 2009 influenza epidemic, Decision No 1082/2013/EU of the European Parliament and of the Council of 22 October 2013 on serious cross-border threats to health and repealing Decision No 2119/98/EC fixed the measures to take in case of public health threat, whether it be connected to infectious agents or conversely non-transmissible ones, to biological toxins, chemical products or environmental causes. It provides that the European Centre for Disease Control and Prevention (ECDC) will operate an epidemiological watch network following transmittable diseases and the associated specific problems.

Table 5: The European Union’s main public health alert systems

- The European Early Warning and Response System (EWRS) was created after Decision No 1082/2013/EU so that the EU countries would be quickly informed about any serious cross-border public health threats, facilitating the exchange of information. The new October 2017 Action Plan initiates the modernization of its infrastructures in 2018, especially to improve the connection of the system to other European ones;
- The Rapid Alert System for Chemical incidents (RAS-CHEM) connects treatment centres for poisoning cases in various Member States;
- The European Community Urgent Radiological Information Exchange (ECURIE) that could be used if radioactive products were introduced illegally or circulating without sufficient precaution between the Member States (210 polonium powder in 2006, for instance);
- The Rapid Alert System Task force on Biological and Chemical Agent Attack (RAS-BICHAT) used in case of chemical or biological terrorist attack;
- The System for the Rapid Exchange of information (RAPEX) informing about the dangers regarding non-alimentary consumer goods, including the dangers due to the use of toxic ingredients;
- The Rapid Alert System for Food and Feed (RASFF) aimed at protecting consumers from foodstuffs that do not meet safety standards.
- The warning system dedicated to animal health.

4.2. Operational detection at the EU borders and within the Union

Operational detection encompasses three types of contexts: the monitoring of continuous flows, a targeted intervention after the detection of a suspicious element warranting further scrutiny, and intervention based on intelligence information or after an intentional or accidental incident.

In the R&D sphere, since 2004, the EU has supported several R&D projects aiming at developing new methods to inspect the circulation of freight, containers and vehicles to discover not only nuclear or radioactive material, but also toxic chemical agents, and explosives as well as drugs (see Point 4.2.3).

The CBRN Action Plan and the programmes supporting the R&D have also allowed the development of mobile means of testing that can be deployed on site in case of a suspicious discovery. Miniaturisation of components has allowed the design of compact and robust equipment, usable on the ground and thus transportable by specialized vehicles sent and deployed to the site of discovery of the suspect product. As an example, on board mass spectrometer can give information on the nature of an unknown agent. However, handling appropriately the mass spectrometer requires staff to be trained beforehand. Emergency services or the armies of most Member States now have vehicles with detection, identification and sampling equipment for CBRN agents. They generally include handhelds detectors used for an initial assessment (see Points 4.2.1. and 4.2.2.), but also more sophisticated equipment.

Generally speaking, benefits of mobile means are obvious, as they allow in situ measurements and can be deployed at high-priority locations, for example in the context of mass-gatherings, customs controls
or in the aftermath of a technological accident or CBRN attack. Practical difficulties lie in maintaining operational capacities of staff over time, through regular training and interventions in real conditions, as well as maintaining equipment in operational condition and managing consumables and their shelf life (e.g. primers and probes for real-time PCR systems, detection tickets).

In many cases, it may be equally effective to send samples to a reference laboratory by road or air, all the more so as preliminary analyses performed on the ground, including using equipment transported by specialized vehicles, always require laboratory confirmation.

4.2.1. Operational nuclear and radiological detection

In the nuclear and radiological field, some Member States have developed technical means for detecting movements in the context of the fight against illicit trafficking of nuclear material or of radioactive sources. One of the most elaborate example is that of the United Kingdom with Programme Cyclamen. It combines both radiation detection portals and mobile equipment that are used to scan vehicles, containers, luggage as well as individuals, especially at ports and airports. Similarly, R&D work carried out in France has led to the development of fixed or mobile detection beacons and of portals. They are deployed at ports and airports, as well as for the protection of railway networks and sensitive facilities. Mobile devices can also be used in the course of investigating illicit trafficking.

As of 2004, the EU and the USA signed a customs agreement extending to Europe the American security initiative about containers. That agreement aims at getting the EU Member States’ participation in checking the containers bound for the USA, in making sure that they did not contain equipment or products that could become mass destruction weapons, one of the main targets of such controls being nuclear and radiological products. Even if this initiative aims at protecting the USA more than the European Union, it has enticed some European partners to follow the same policy and check the containers, vehicles or luggage entering their territories. It involves a number of countries equipped with detection gates, many of them deployed through the American Nuclear Smuggling Detection and Deterrence Program (NSDDP). Those gates have also sometimes been used to check the possible radioactivity of containers shipped from Japan after the Fukushima catastrophe (in Rotterdam Harbour, Netherlands, for instance).

Detection devices include both non-selective and specific sensors, with some sensors detecting alpha, beta, gamma and neutron radiations while others detect and identify the specific type of isotope. In particular, as very few substances emit neutrons, neutron detection is an effective means of identifying the presence of nuclear materials. Imaging systems contribute to pinpoint locations that warrant further examination. As radiation sources may be intentionally masked by shielding, jointly using X-ray inspection systems may also provide valuable information on suspicious luggage or containers warranting further examination. Analysing signals can make it possible to evaluate the nature of the radioelements. The vast array of products goes from person-portable devices to drive-through systems used at airports, harbors or border crossings.

In addition, ensuring the efficiency of detection systems requires countries to develop and be able to implement operational procedures, should results be positive, for example with regard to immobilizing a vehicle and carrying out a detailed examination of transported freight.

4.2.2. Operational chemical and biological detection

Operational detection of chemical or biological agents, i.e. the ability to detect a chemical or biological agent in the context of continuous flows of individuals, luggage, vehicles or freight, remains an
objective to be achieved. Currently, the main operational approach is to first use X-ray scanners and then conduct a search if suspicious elements that may relate to unconventional agents are detected.

Portable instruments currently commercialised especially for emergency services are mainly intended to detect significant concentrations of agents in the surrounding environment or to analyse samples. In the best of cases, laboratory analyses of samples collected from packaging may allow initial detection, but this method is unsuitable to deal with flows. Portable equipment also has the disadvantage of targeting only certain products or classes of products. In addition, negative results are not an absolute guarantee that there is no hazardous material.

As for standoff detection, optical (i.e. laser-based) devices can monitor large areas and detect the release of chemical agents into the atmosphere. Such instruments are also currently being developed to detect biological aerosols. However, they are obviously of no use when chemical or biological agents are contained in closed receptacles.

Field biological detection relies on immunological and nuclear-acid based methods. Equipment include detection tickets (enzyme immunoassays) and portable platforms the detection principles of which are based on enzymatic or polymerase chain reaction (PCR) techniques. These tests provide valuable inputs in the context of an on-site rapid assessment. Yet, many of them have limited sensitivity and confirmatory testing by expert laboratories is mandatory.

Regarding chemical agents, on-site methods include manual vapour detection (enzyme) tickets and tubes that are sufficient to determine the presence of mustard and nerves agents. To achieve an identification to some extent, they can be combined with the use of detection paper, the principle of which is based on dyes that are dissolved by drops of chemical agents (red indicates the presence of mustard agent, yellow of nerves agents, and dark green of VX). However, many other substances can react with the pigments. Besides, on-site screening techniques include ion mobility spectrometer, flame photometry, surface acoustic wave, Raman spectroscopy or infrared spectroscopy. Portable mass spectrometers are also commercialised but their use in the field still remains limited due to their size, weight and power requirements.

4.2.3. Operational detection R&D

A number of European countries have launched research programmes on operational methods to detect highly shielded nuclear and radiological material, but also chemical agents, as well as explosives and narcotics.

For example, British scientists have been among the first to study muons scattering tomography (MST) for scanning shipping containers in search of nuclear material obstructed by thick shields. Muons, produced when cosmic rays collide with particles in the upper atmosphere, are heavier than electrons. By comparison to X-rays or other forms of radiation, as they do not lose as much energy when travelling, they penetrate more deeply into much denser and thicker material. The system, still in development, records how muons passing through a container are deflected, anomalies allowing detection of obstructed material and objects.

Methods currently used to detect nuclear and radiological material are mainly passive, recording natural radiation and emissions (gamma rays or neutrons). By comparison, active systems operate by probing targets with radiations. Early European research in this field was funded by the European Union in the framework of the FP-7 R&D programme. Projects EURITRACK (2004) and Euritr@ck (2008) aimed at increasing security at seaports by developing a Kit to non-intrusively detect explosives or other threat
material concealed in shipping containers.\textsuperscript{16} They involved partners from France, Italy, Croatia and the Republic of Ireland, including the EU Joint Research Centre. They sought to design, develop and test a tagged neutron inspection system. Used to non-intrusively probe suspicious contents located beforehand by X-ray radiography, this system was tested for more than 3 years on a container control chain. The EU is currently financing the new C-BORD project (Effective Container inspection at BORDer control points)\textsuperscript{17} as part of the Horizon 2020 programme. It includes the use of detectors developed in EURITRACK, after performing a comprehensive characterization. The project aims at developing and combining new and improved non-intrusive operational solutions to help customs inspect container and large-volume freight, considering a large range of targets, encompassing chemical warfare agents and Special Nuclear Material (SNM):

- Advanced radiation management;
- Next Generation Cargo X-Ray to improve the accuracy of material discrimination and image interpretation (British partner);
- Tagged Neutron Inspection for the detection of chemical agents (French and German participants);
- Photofission to detect SNM even if they are shielded (French, Italian and Polish participants);
- Evaporation Based Detection to detect volatile chemicals (French and German participants).

Outside of the next generation X-ray, however, truly operational devices will likely not be available before several years.

### 4.3. Laboratory analyses of chemical and biological agents

For chemical detection, when there is no a priori hypothesis about chemical constituents, mass spectrometry remains widely used, with instruments that are more and more sophisticated. Separation and identification of chemical agents can be achieved by implementing chromatographic and spectrometric analytical techniques, individually or in combination. Common laboratory approaches thus include various modern mass spectrometry-based methods coupled with either gas chromatography (GC) or liquid chromatography-mass spectrometry (LC), as well as Nuclear Magnetic Resonance (NMR) spectroscopy.

Many kinds of methods are used for laboratory biological detection and identification, including immunological and nuclear-based ones, or a combination of both kinds, as well some based on chemical and physical properties. Common identification techniques include mass spectrometry, PCR, and Raman spectroscopy, with instruments also becoming more and more sophisticated. Among biological agents, direct identification of microorganisms in either environmental or clinical samples has traditionally been performed after cultivation. Moreover, many microorganisms are not easily cultured, unculturable or slow-growing. Bypassing the culture stage thus reduces time-to-results and simplifies the analytical process. In this respect, PCR and gene sequencing are most useful, as are other technologies that are becoming increasingly important such as mass spectrometry, multiplex PCR and Next Generation Sequencing (NSG).

\textsuperscript{16} http://www.euritrack.org/

\textsuperscript{17} http://www.cbord-h2020.eu/
4.4. The organization of laboratories

The anthrax letter episode in the USA (2001) dramatically raised awareness about CBRN threats by non-state actors. In the aftermath, among other actions, the EU and its Member States undertook to strengthen specialized laboratories capacities. While this does not directly address illicit trafficking and control challenges, these laboratories provide means to analyse suspicious samples taken during controls and/or to assess and characterize incidents that may reveal smuggling networks.

While portable analytical instrumentation has been developed, scientific and technical advances in the field of chemical and biological detection are not predominantly related to operational detection, which involves the management of continuous flows. They rather focus on improving laboratory capacities in terms of carrying out simultaneously a large number of sample analyses over a short period of time. This evolution concerns both chemical and biological agents whatever their nature (viruses, bacteria, toxins, etc.).

This approach aims to enable rapid large-spectrum detection and identification when there is no a priori hypothesis about the nature of the sample, with the possibility to carry out comprehensive quantitative and qualitative analyses in complex matrices. In a forensic-driven approach, characterization and profiling of samples can contribute to determine the origin of the material and how it was obtained or produced, and thus to dismantle illicit importation chains.

In the biological field, among other improvements, developments of soft ionization techniques associated to progresses of mass spectrometry technologies offer new perspectives for biological detection and identification, allowing to perform very quick sample analyses while being less and less constrained by hypotheses on the nature of the agent. Next Generation Sequencing (NSG), also referred as High-Throughput DNA sequencing, allowing a wide-spectrum approach, makes it possible to detect low levels of microorganisms after sample preparation or enrichment, identify any unknown or emerging biological agent without a priori information, establish virulence profile and antibiotic sensitivity, ascertain the origin of agents or samples, or highlight evidence of genetic engineering. These massive parallel-sequencing platforms reduced costs and brought about significant advances, but many challenges still lie ahead, from sample preparation to the analysis of the large amount of data that is generated.
Table 6: Significant national and EU-funded initiatives pertaining to the organization of laboratories

- Several European countries identified reference laboratories and organized networks to be able to process (potentially large numbers of) CBRN samples, should the need arise. For example, France formalised in 2004 the structure of the national network of “Biotox-Piratox” laboratories (Réseau national des laboratoires Biotox-Piratox, RNLB), network of networks that can cover the whole spectrum of chemical and biological threat agents. The following year, the UK and the Netherlands respectively established the National Network of Laboratories and the National Network of Laboratories for Terrorist Attacks (Landelijk Laboratorium Netwerk terreur aanslagen, LLN-ta). The Swedish Laboratory Response Network (Svenska Laboratorieresponsnätverket) was established in 2009.

- In addition, the Commission has funded, under different funding schemes (e.g. Seventh Framework Programme and Horizon 2020 Programme, Prevention of and Fight against Crime (ISEC) Programme of the DG Home Affairs of the European Commission), a number of projects aiming at strengthening laboratory capacities at European level or at helping to structure national networks. They include EQADeBa (Establishment of Quality Assurances for Detection of Highly Pathogenic Bacteria of Potential Bioterrorism Risk), QUANDEM (Quality Assurance Exercises and Networking on the Detection of Highly Infectious Pathogens), EQUATOX (Quality Assurance for the Detection of Biological Toxins of Potential Bioterrorism Risk), ERINHA and ERHINA2 (European Research Infrastructure on Highly Pathogenic Agents), as well as IB-Bioalernet (Iberian network of laboratories of biological alert).

- In the public health field, the Joint Action EMERGE (Efficient response to highly dangerous and emerging pathogens at EU level) organises a European network with about 40 diagnostic laboratories that focus on risk group 3 bacteria and risk groups 3 and 4 viruses. In case of a public health emergency, it has developed a procedure enabling the Member States that have capacities to detect dangerous infectious agents to put those means at the disposal of under-equipped States with the aim of identifying the agent and determining its characteristics as fast as possible. In this respect, mobile means of testing have been used in West Africa during the 2014 Ebola virus epidemic, notably a mobile biology laboratory belonging to the EU.


4.5. The forensic capacity with regards to suspicious agents and materials seized by the authorities

Forensic sciences or forensics bring together all the different testing methods based on sciences (chemistry, physics, biology, neurosciences, computing, mathematics, medical imaging, statistics) in order to provide wide support to investigation work. Thus, the precise characteristics of the agent or product that has been seized inform the investigators about its making and its origin. That is a major capacity as it enables them to trace the source of the tested agent, so that it can help preventing new actions in neutralizing the channels through which the product has been conveyed into the EU. The new 2017 CBRN Action Plan fore and foremost aims at strengthening the cooperation of the Member States in the nuclear and radioactive material forensic field.
4.6. The ability to assist authorities in the event of searches or preventive operations that may lead to the discovery of CBRN agents (trafficking, etc.)

For example, in Germany, the Central Federal Support Group in Response to Serious Nuclear Threats (Zentrale Unterstützungsgruppe des Bundes für gravierende Fälle der nuklearspezifischen Gefahrenabwehr, ZUB) and, in France, the Détachement central interministériel d'intervention technique (DCI) are specialised operational units, able to intervene for any investigation and/or technical surveillance against trafficking or any other illicit action relating to nuclear or radioactive material (theft, preparation of attacks, etc.). In particular, they have land and air assets to detect the presence of radioactive sources or nuclear material.
5. TOWARDS A COMMON STRATEGY TO PREVENT AND CONTROL THE INTRODUCTION OF CBRN AGENTS INTO THE EUROPEAN UNION

5.1. A positive assessment of the EU’s Action Plan and the enactment of the complementary programme

The assessment of the measures taken in the CBRN field by the EU, for more than ten years, is very positive, notably regarding the steps taken to reduce the risks of introduction of CBRN agents, products or equipment into the EU and/or of their circulation between the Member States. Those measures have adequately supplemented the actions taken on by each State.

The positive assessment does not imply that the current situation is totally satisfactory considering the complexity of prevention, detection and control of illicit trafficking and movements of CBRN products. It is undoubtedly one of the main reasons which accounts for the launching of the complementary October 2017 Action Plan to enhance preparedness against chemical, biological, radiological and nuclear security risks\(^\text{18}\) which outlines four priorities concerning the object of this study:

1. Reducing the accessibility of CBRN material;
2. Ensuring a more robust preparedness for and response to CBRN security incidents;
3. Building stronger internal-external links in CBRN security with key regional and international partners;
4. Enhancing our knowledge of CBRN risks.

5.2. Towards a European-scale integrated system for the control and detection of illegal movements of CBRN agents, products and equipment

The notion of integration is justified in several respects:

- A system integrating all the Member States, in collaboration with international organizations and the other states participating in the centre of excellence project;

- A system integrating all the functions contributing to the prevention and the control of illicit CBRN movements, interconnected within a coherent chain of action.

---

Table 7: A comprehensive and consistent set of functions to prevent, detect and disrupt illicit trafficking

- A permanent ongoing prevention:
  - Upstream, supporting of countries outside the EU;
  - Regulating and monitoring of the agents, material or equipment that could be used in CBRN acts;
  - Protecting the research, production, storage and trading facilities as well as the means of transport;
- An ongoing monitoring of threats and identification of weak signals and alerts;
- Operational detection at EU borders, including at entry points, or within the EU;
- The strengthening of the alert posture in the context of a pre-alert;
- The search for the agent (e.g. search of premises, collection of samples);
- Laboratory tests and procedures;
- Preventive actions of specially trained anti-terrorist units;
- The criminal and technical investigations to identify the source of the events (forensics);
- The information of the actors, their training and the joint exercises;
- Lessons learned process.

The Member States’ approaches are very heterogeneous. Actually, few of them have the capacity to carry out all the functions contributing to the control and detection of CBRN illicit trafficking. Other countries, beset by numerous priorities in terms of security, do not have that capacity. On the other hand, the EU as a whole possesses know-how, technology and means enabling to set up an efficient integrated system.

Should a Member State have to face a CBRN threat resulting from illicit trafficking, the European added value would be, upon request from that State, to mobilise the capacities and means of the other Member States for its benefit.

**PROPOSAL 1**: so as to have the best capacities to oppose efficiently the introduction of CBRN agents or products into the European territory, the EU might be suggested to organize an integrated European system of prevention and detection of CBRN agent, product or material illicit movements.

At the request of a Member State in case of suspicion or theft or trafficking, the other Member States’ expertise and/or means (investigation, inquiry security, surveillance, detection tests carried out by specially fitted vehicles or laboratories, etc.) might be called forth. On such occasions, the role of the EU would consist in:

- Constantly updating the list of the contribution that each State would be ready to put at the disposal of its partners;

- Planning from now on a common logistic organisation enabling contributors to provide quick support to the involved Member State (for example, airborne transportation of samples to a laboratory or support of experts to investigate a location where CBRN products may have been found);
When necessary, and in close collaboration with the country requesting assistance, coordinating the search for the contributions that Member States could provide, as well as organising their transporting.

The carrying out of the October 2017 complementary Action Plan is closely linked with the setting up of such an integrated system. It is suggested to add five complementary measures, clearly derived from the EU added value (Propositions 2 to 6):

1. Controlling transactions regarding some key chemical agents that might be used for illicit purposes;
2. Securing transfers of highly pathogenic biological agents from a Member State to another;
3. Optimising the continuous monitoring of threats and the identification of weak signals and alerts;
4. Strengthening CBRN detection at borders, from the overall organisation to procedures and technology;
5. Formalising practical rules enabling the CBRN specialized laboratories of the various Member States to work together. That field has been explored under the aegis of the EU, harmonized operational rules have to be strengthened and extended.

5.3. The control of transactions pertaining to agents that might be used for illicit purposes

If CBRN agents, products and equipment of any sort that can be used as weapons are regulated by international agreements or by regulations on dual-use goods, it is still necessary to regulate the sale of some toxic products which are commercialised without any control, at least in some Member States.

**PROPOSAL 2:** Elaborating a European draft regulation on the control of some toxic chemical agents and their potential precursors that could be misused.

Regulation (EU) No 98/2013 on the marketing and use of explosives precursors\(^\text{19}\) is currently a model that could be built upon to develop a similar tool focusing on a series of toxic chemical compounds or even precursors that are authorized but may also be exploited for illegal uses.

With a view to simplification on the Union scale, the operational management of national systems might be associated with the management of explosives and their precursors to avoid confusion between different channels for feedback.

For efficiency, those regulations might mainly target agents and products considered as priorities due to their potential effects and the ease with which they can be obtained.

In the field of radioactive sources, UE could take a part in the IAEA’s work and implement its recommendations.

---

5.4. **Securing transfers of highly pathogenic biological agents from a Member State to another**

Regarding biological agents, some transfers of sensitive pathogens between laboratories located in different Member States have been problematic. It would therefore be advisable to lay out definite security rules for those transfers within the Union, especially to ensure the continuous escort of security services on both sides of the borders.

PROPOSAL 3: The establishment of a dedicated focal point at European level to **coordinate the continuity of the security measures applied to some transports of** highly-dangerouspathogens between laboratories located in different Member States when crossing borders.

5.5. **Aiming at a European capacity to connect several alerts of different natures in order to detect suspicious traffics at an early stage**

As mentioned previously, the EU set up a comprehensive range of alert systems, at least a dozen of which can apply to the CBRN alert. They are often coupled with databases recording various events (e.g. information about a threat, suspicion of intoxication by a toxic product, discovery of a rare bacteria in food). In addition, there is also the main alert network of the Commission baptized ARGUS (General Rapid Alert System of the European Commission).

The standing monitoring of threats and the “spotting out of odd occurrences” require collecting information coming from different kinds of alert systems (from police to public health services) in a dedicated centre where a multidisciplinary team should be able to analyse them, put through signals of various origins and dispatch the alert to the Member States that might face illegal CBRN movements.

Convergence of information is a challenge both at Member State and EU level. Information comes via different services and is reported by channels that are sometimes partitioned according to their own preoccupations. Thus, customs services is not necessarily CBRN-oriented while they are generally looking for drugs. Likewise, a police investigation service is not always aware of public health information that may be related to the current investigation.

PROPOSAL 4: Specifying at the EU level the focal point where weak signals and alerts of every nature pertaining to CBRN threats will be collected, as well as the configuration of the multidisciplinary team in charge of their analysis.

5.6. **Strengthening the surveillance capacity at borders**

Among the priorities that have to be supported within the framework of European projects, the control of the flows of passengers, luggage, freight and vehicles is essential, as it is for the detection of explosives. To that extent, the actions financed by the EU through the FP7 and Horizon 2020 programmes seem quite promising. However, setting up a coordinated action plan should not wait for the development of industrial solutions.

PROPOSAL 5: Establishing with FRONTEX a **strategy for the control and detection of CBRN material and explosive trafficking. Assessing the corresponding needs in terms of technical systems.** Organizing the training of customs officers and operators.
Means already exist. A container merchant ship can now often carry between 10,000 and 15,000 containers, and a survey carried out by the JRC showed how the documents associated with the shipping of goods could be exploited to spot out suspect containers which might be targeted for control. In this respect, Sweden informed the EU about the way its nuclear specialized teams use the existing radioactivity detection portable devices for such controls prior to entry into harbours20.

Until last technological innovations are available, it seems essential to strengthen capacities on the outer borders of the Union to be able to control and detect the illicit trafficking of dual use items. That vigilance is part of the missions attributed to the FRONTEX organization when it was created.

5.7. **Aiming at an extended cooperation between laboratories**

The EU has achieved important preparatory work regarding the common work of CBRN competent laboratories located in the different Member States. In terms of concrete implementation, for example, a network of biosafety level 4 laboratories has already been set up.

Merely finding a suspicious product is not sufficient. It has to be handled following a precise pre-established process which involves much more than testing procedures. The following issues have to be taken into account when structuring such a network:

- Using validated equipment and procedures for sampling, ensuring the integrity, conservation and quality of the sample;

- Implementing a triage method for the treatment of samples in case of numerous alerts;

- Integrating legal requirements so that those tests might be used for judicial procedures (all competent CBRN laboratories do not integrate these considerations and there may be differences from one Member State to another).

The two main purposes of the tests should also be considered:

- Performing a quick identification of the nature of the agent (with a view to protecting the public);

- Exploring in-depth the characteristics of the sample to trace the origin for forensic purposes and to dismantle the illegal trafficking channel.

**PROPOSAL 6:** Concretely undertaking the implementation of a more global [European CBRN network](http://www.enea.it/it/sequici/pubblicazioni/pdf-volumi/v2017-cbrn.pdf) enabling to resort to the existing capacities of the Member States’ laboratories to analyse suspect products.

The EU could first and foremost ask each Member State, through its permanent representation, to name an institutional focal point that will provide a list of laboratories. Then, via the focal points, it could launch a process to:

- Determine harmonised rules and sampling procedures (including the marking, conditioning and transportation of those samples), their handling according to the tests that have to be performed, as well as their conservation, restitution or destruction;
- Determine harmonised testing procedures depending on the expected results; and
- Accordingly, update specifications for the laboratories that the Member States would like to recruit, based on the preparatory surveys achieved in the framework of the 2009 EU CBRN Action Plan.\(^\text{21}\)

6. ULTIMATE PURPOSE: STRENGTHENING THE CHAIN OF CBRN DETECTION AND CONTROL MECHANISMS

The various proposals listed in this study need to be examined both at EU and Member State level. They aim at avoiding that important efforts developed to boost some functions related to illicit trafficking prevention and detection at the borders and within the EU might end in a weak system regardless, as the strength of the chain of essential functions remains limited by its weaker link.

The proposals fall within the context of the new EU CBRN Action Plan and are intended to supplement the actions it lists and/or to put the emphasis on some of them. They might constitute, together with the plan, a comprehensive corpus, showing once more the various facets of the EU added value. The importance of ensuring consistency between the contributions of the Member States, supporting research and development with the involvement of Member States, harmonising safety and security rules, mutualising some systems and coordinating actions at the external borders of the EU should not be underestimated.
REFERENCES

- Baker S. Next Generation Sequencing Challenges. 2017;37(3).
- Eurojust, Counter-Terrorism team. EUROJUST CBRN-E handbook, Overview of EU and international legislation applicable to CBRN (Chemical, Biological, Radiological and Nuclear) substances and Explosives. 2017.
This study, commissioned by the European Parliament’s Policy Department for Citizens’ Rights and Constitutional Affairs at the request of the Special Committee on Terrorism of the European Parliament (TERR) examines the challenges pertaining to CBRN illicit trafficking that the European Union faces. Taking into account the new October 2017 CBRN Action Plan as well as existing mechanisms and solutions, it focuses on means to prevent and detect the introduction into and movement within the Union territory.