31/01/2023

Version no. 1.0

EXERTER

Security of Explosives pan-European Specialists Network

D4.1 Opportunities for standardization and certification in the field of security of explosives

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This project has received funding from the European Union’s Horizon 2020 research and innovation programme under grant agreement no. 786805

D4.1
Opportunities for standardization and certification in the field of security of explosives

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Document information	
Version no.	*Date*
1.0	31/01/2023

Summary

EXERTER connects 21 practitioners from 13 European Union (EU) Member States (MS) and associated countries across Europe into a Network of Explosives Specialists. The network aims at identifying and promoting innovative methodologies, tools and technologies that will offer solutions in the fight against terrorism and serious crime, i.e. enhancing the overall Security of Explosives. The core of the EXERTER network brings together experts coming from Law Enforcement Agencies (LEA) and Military Institutes, Governmental and Civilian Research Institutes, Academia and Standards Organisations.

Standardisation is one of several tools for countering the capability gaps in the field of SoE, well as the opportunity for innovations to scaling the market. Together with certification and regulation aspects, this can improve security by enhanced harmonization and trust. In addition, it can facilitate for manufacturers to compare their products and to reach broader markets.
The identification of (technological) standardisation needs may enable at improving the performance of SoE, by setting performance requirements, and may decrease costs of the proven technological solutions by better interoperability, and introduce new concepts to fight terrorism by introducing market opportunities for manufacturers.

The goal of WP4 is to identify opportunities for standardisation in the field of security of explosives, in the domains prevent, detect, mitigate and react.

The approach to standardisation in the field of security of explosives seems to be fragmented, with many initiatives, some of them repeating previous work. Coordination on a European level seems missing.

Examples of initiatives from previous years include:

1. The Certification, Testing and Trialling report from the Network on Detection of Explosives (2011)
2. ERNCIP initiatives starting in 2009 and on-going
3. The HECTOS FP7 project (2014-2017).

The field of aviation security is a special field with respect to standardisation end certification. It is one of the most mature fields, but is also perceived as complex, slow and expensive.

Based on the observations in this report, the following opportunities and recommendations for standardization and certification in the field of security of explosives, are identified:

1. Use the existing information and schemes developed in previous projects. Especially the HECTOS proposed schemes can be used almost directly to develop and implement standards, but also the NDE scheme, which also involves trialling of new technologies, can enhance innovation.
2. Coordinate the development of standards and certification on a European level. Make sure that it leads to a coherent set of standards, throughout the prevent, detect, mitigate and react domains.
3. The performance standards should reflect on one hand the ambition, derived from the level of inferred security provided by a technology (or method), and on the other the current and near future realizable technical performance. The resulting performance standards (current and future tiers) are, therefore, attractive to industry and SMEs because they represent a realistic market outlook, and the streamline competition on performance.
4. Pay special attention to the exchange of classified information with innovators and enable strong interaction between innovators, end-users and policy makers. This ensures that products will better meet expectations of end-users and requirements from potential regulators.

Contents

1 Introduction

1.1 Background

EXERTER connects 21 practitioners from 13 European Union (EU) Member States (MS) and associated countries across Europe into a Network of Explosives Specialists. The network aims at identifying and promoting innovative methodologies, tools and technologies that will offer solutions in the fight against terrorism and serious crime, i.e. enhancing the overall Security of Explosives. The core of the EXERTER network brings together experts coming from Law Enforcement Agencies (LEA) and Military Institutes, Governmental and Civilian Research Institutes, Academia and Standards Organisations.

The main objectives of EXERTER are:

- Providing solutions to practitioners in the field by extrapolating terrorist threats and attack strategies from recent incidents and matching these with existing and emerging technologies and tools
- Ensuring the practice-relevance of Research and Development (R&D) activities by defining end-user requirements and pinpointing existing capability gaps
- Supporting practitioners as well as academia, developers and innovators in their search to find potential industrial partners who have the capability to exploit the innovations into products
- Enhancing practitioner's operability by supporting standardisation and certification bodies as well as regulators with standardisation and certification priorities in order to facilitate comparison of Security of Explosives (SoE) products and procurement
- Enabling a long-term cooperation among explosives specialists in the security area beyond EXERTER

Standardisation is one of several tools for countering the capability gaps in the field of SoE, well as the opportunity for innovations to scaling the market. Together with certification and regulation aspects, this can improve security by enhanced harmonization and trust. In addition, it can facilitate for manufacturers to compare their products and to reach broader markets.

The identification of (technological) standardisation needs may enable at improving the performance of SoE, by setting performance requirements, and may decrease costs of the proven technological solutions by better interoperability, and introduce new concepts to fight terrorism by introducing market opportunities for manufacturers.

1.2 Objectives and content of the report

The goal of Work Package (WP) 4 is to identify opportunities for standardisation in the field of security of explosives, in the domains prevent, detect, mitigate and react.

Within WP4 of the EXERTER project an inventory is made of past and ongoing activities in the field of standardisation related to the security of explosives. Also two dedicated webinars were organised to collect the views of all relevant stakeholders.

Chapter 2 contains some definitions and terminology. Chapter 3 is an inventory of past and ongoing activities. Chapter 4 describes the webinars that were organised, and their outcome. Chapter 5 identifies opportunities for standardisation. Annex A and B contain detailed information on the HECTOS FP7 project, and annex C is a list of relevant Comité Européen de Normalisation (CEN) and International Organization for Standardization (ISO) technical commissions.

2 Standards

This chapter provides a short background on standards. It is meant to be informative, and is applicable in the framework of this document. It is not meant to be exhaustive. For a comprehensive investigation into standards in general, see for instance [1]

2.1 *Definitions*

According to CEN a standard is ” ... *a technical document designed to be used as a rule, guideline or definition”* [2]. The purpose of a standard is to achieve better safety and/or quality, when executing a (repeatable) task or making a product.

A broader definition is supplied by [3] for a technical standard: *”A technical standard is an established norm or requirement for a repeatable technical task which is applied to a common and repeated use of rules, conditions, guidelines or characteristics for products or related processes and production methods, and related management systems practices.”*

Also Hectos Deliverable 2.1 [18] provides a definition.

2.2 *Types*

Standards can be classified in several ways. Well known is the distinction between a ’voluntary’ standard and a ’mandatory’ standard. Also ’de facto’ standards exist, when a dominant party product or way of working is generally accepted, without any involvement of stakeholders in the creation of the standard Standards can also be classified on the use case. For instance a standard can be a set of (performance) requirements, describe a test method, describe a procedure (e.g. SOPs: Standard Operating Procedures), serve as guidance (sometimes referred to as ’best practice’) or contain a definition.

Standards can also have a different geographical reach or level, like international standards (‘world’ standards), regional standards (e.g. European Standards), or national standards.

In this document the following classifications will be used, if applicable

- Best Practice: standard not enforced by legislation, deviation does not have consequences;
- Voluntary standard: standard not enforced by legislation, but deviations can have commercial of legal consequences;
- Mandatory standard: standard enforced by legislation.

In addition the following types will be distinguished

- Standard requirements: a set of (technical) requirements
- Performance standard: a set of performance requirements
- Standard test methods: a specific set of test procedure that, when followed, produces a test result. This result may be used to determine if the test object complies with the requirements in a standard.
- Standard Operating Procedures (SOP) gives a set of instructions for performing operations or functions

2.3 *Organisations*

There are numerous organisations involved in, or related to the development of standards. Well known are ISO, CEN, National Institute of Standards and Technology (NIST) and American Society for Testing and Materials (ASTM), organisations dedicated to the developing, coordinating, revising, amending and reissuing of standards. Also there are national bodies like Nederlandse Norm (NEN) in The Netherlands and Deutsches Institut für Normung (DIN) in Germany. A full overview can be found in [4]. There are other organisations involved in the development and implementation of standards such as governments or governmental organisations (e.g European Commission), international organisations (e.g. North Atlantic Treaty Organisation (NATO or the European Civil Aviation Conference (ECAC)) and trade unions and trade organisations (e.g. European Organisation for Security (EOS)).

3 Past and ongoing activities in the field of standardisation related to the security of explosives

Though an effort was made to be as comprehensive as possible, this chapter is not exhaustive. However, it contains relevant initiatives in the field of standardisation related to the security of explosives of recent years.

3.1 *Network on Detection of Explosives*

The main aim of the European Network for the Detection of Explosives (NDE), which was commissioned by DG HOME, was to support the EU and the Commission in the tasks related to the implementation of the EU 'Action plan on enhancing security of explosives', particularly of its detection section. This was done by providing expert knowledge on a variety of analytical and technical issues, by supporting the EC at meetings, by preparing studies and by organizing a biannual conference on the detection of explosives. The goal is to form a stable and effective working NDE network of European alliances, organizations, institutes and companies, to ensure a continuous and profitable exchange of information within the network and between the EU Member States.

One of the studies carried out by the NDE was on the Requirements for the Implementation of a European Certification, Testing and Trialling (CTT) Process for Explosives Detection [5]. This study was a follow-up of some of the recommendations made by the Task Force on Security of Explosives in their report "Enhancing the security of explosives – Report of the explosives security experts' task force" (2007) [6]. The state of the art review confirmed that outside the ECAC detection standards and common test methodologies for the aviation security, there are no evaluation and test methods for performance assessment of explosive detection equipment.

Partly based on the ECAC evaluation approach, but recognising that every application needs its own CTT approach, the report comes to a possible work procedure for the CTT process in terms of standardization, certification, testing, system R&D, requirements definition / implementation and trialling. The CTT procedure as described in the report aims at increasing the quality assurance on the (explosives) detection market, but also at involving industry and research organizations in more focussed and effective technology development, and to enhance the exchange of relevant knowledge among the concerned stakeholders within all European member states. The report ends with the recommendation that in order to move towards the practical implementation of a CTT process, a scoping study should be carried out to identify the size and scale of activities that are required. This study should include cost-benefit analysis and should consider specific security and explosives detection applications, detection technologies and equipment. It was recognised by the authors though that any decision on this matter should first be discussed from other perspectives (including political and economic aspects) of other stakeholders than those of the NDE expert group.

A second study was carried out by the NDE group in 2013. In the report, equipment focussed, and outcome focussed schemes were analysed as well as how trialling provides necessary input to the requirements for equipment testing, security solution implementation and training of personnel.

The motive to write the report, containing descriptions of CTT, definitions, objectives of a CTT process, and the (2011) status on certification and standardisation procedures, as well as a description of a future CTT process and a possible model for the implementation, was a n EU action plan from 2007 [6]. It contained several actions, related to standardisation:

- Create an EU wide certification scheme for explosives detection solutions also examining the possibilities to extend it beyond the EU;
- Create an EU wide testing scheme for explosives detection solutions where existing work carried out by different bodies is taken into account;
- Create an EU wide trialling scheme for explosives detection solutions;
- Assess the need for the development of standardised processes and procedures concerning the CTT processes, and examine the possibilities to extend them beyond the EU.

The scope of the report was limited to explosive detection systems.

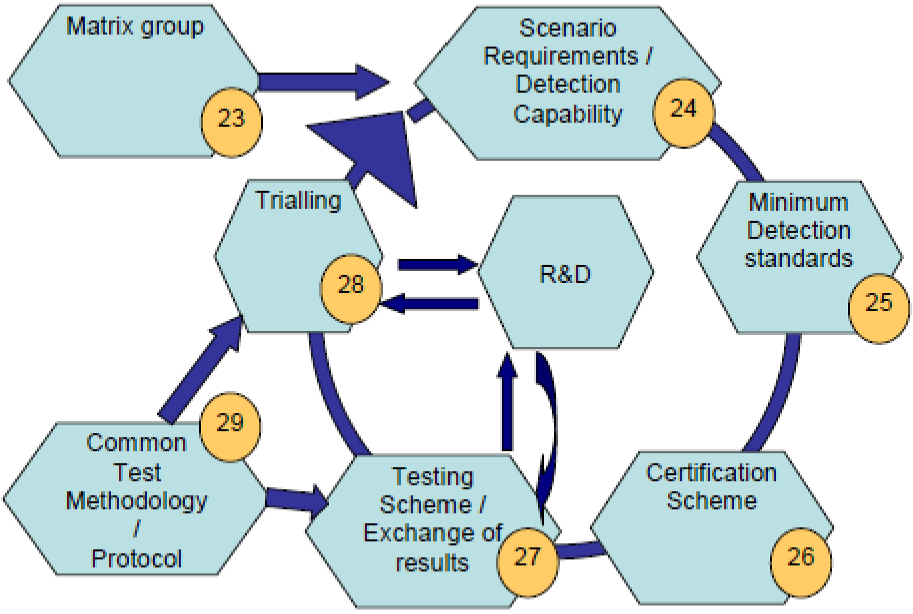
Matrix group
23
Scenario Requirements / Detection Capability
24
Minimum Detection standards
25
Certification Scheme
26
Testing Scheme / Exchange of results
27
Trialling
28
R&D
Common Test Methodology / Protocol
29

Figure 1 Work loop for the major entities involved in the CTT process. The numbers in the yellow circles refers to the task force recommendations [6]; figure taken from[5]

Figure 1 *"illustrates the work loop for the major entities involved in the CTT process. These diagrams should not be taken to imply that there is a linear or spiral path that will be taken by all detection equipment for all applications. In particular, detection performance requirements differ significantly between applications and even in many given applications there is no common requirement. Furthermore, the detection performance requirements on a particular detection system in an application depend on how that system is designed (what other equipment is also being used, what are the con-ops, environmental conditions, throughput requirements etc.). Accordingly, it is not always possible to set the minimum detection standards that are required for a meaningful certification scheme. In many cases, obtaining detection performance data for a range of test objects and test conditions according to agreed test protocols is the best information that can be expected to be provided by a CTT scheme. There is no need to certify all detection solutions, in some cases testing and/or trialling could be enough."* [5]

The report contained 7 recommendations, which are summarised below:

Recommendation 1: Structure and actions in the CTT work procedure

Implementing a central body, and working groups in order to:

1. compile the threat and scenario requirements;
2. develop specification for the standards;
3. set up harmonised trial and testing protocols;
4. audit and approve of existing standards and accreditation organisations;
5. determine the distribution extent of classified material

This central body and working groups should include national and/or European authorities, users of the detection systems, industry, vendors or other organizations contributing to the development of the detection systems, manufacturing or selling the detection systems and accreditation organizations.

Recommendation 2: Responsible parties for the various CTT actions

In order to have a functioning CTT work procedure a number of actions and responsible parties were defined. A schematic was provided in the report (Figure 2).

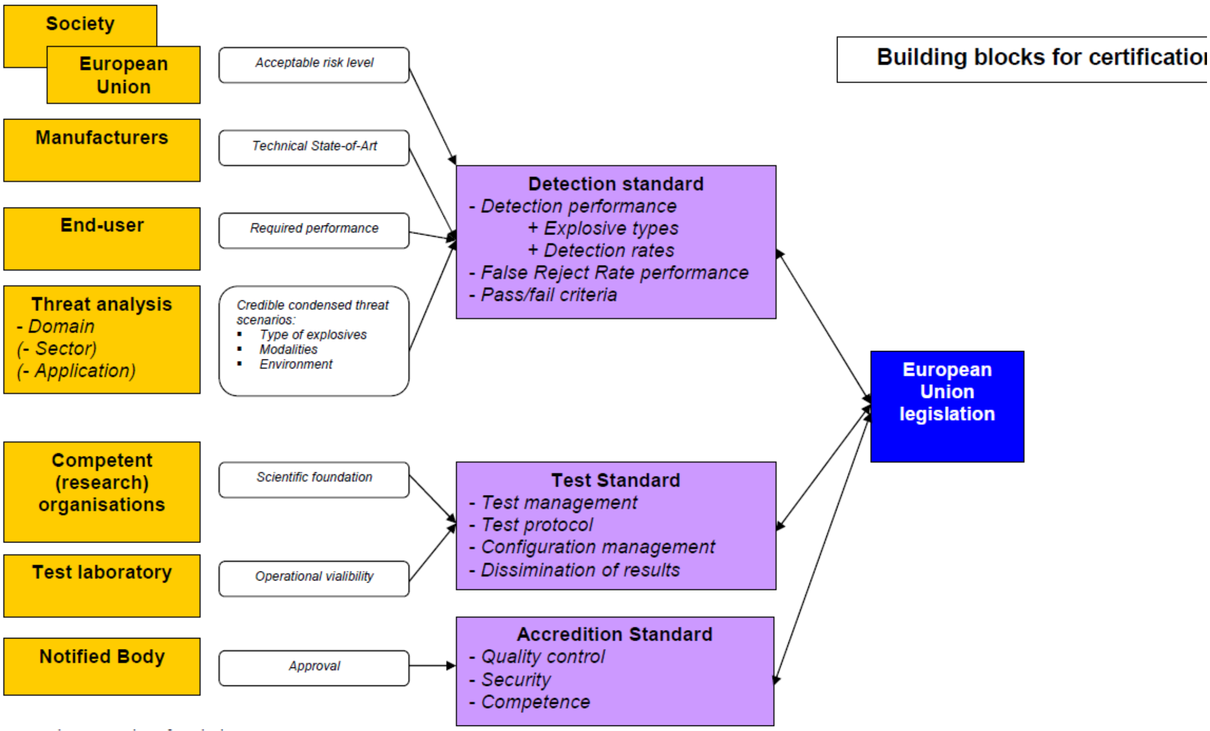

Figure 2 Building blocks for cerification [5]

Recommendation 3: Financial obligations

The EU should finance 'intelligence driven' activities dealing with threat and scenario requirements and development of detection standards, certified reference materials and test protocols, but also more general administrative activities such as handling of classified material and administration of certification and standardisation.

The question of who should pay for having their detection system or equipment trialled, tested and certified needs further discussion at the policy level.

A cost-benefit analysis must be performed in order to appropriately evaluate the financial part in relation to the envisaged CTT work procedure.

Recommendation 4: Dissemination of classified material

The EC administration and/or the producer of the classified should decide on the right and need to know concerning the distribution of classified information. This body will determine to what extent this material will be released to the partners involved in the CTT process.

Recommendation 5: Traceability of the CTT work

It is important to establish a searchable database that can conveniently store all of the required information. The responsibility for maintaining this database should be within the EC administration.

Recommendation 6: Quality assurance maintenance

The various conformity assessment activities (testing, certification, production of reference materials) should all be carried out by entities accredited for this against the suitable quality standard. Audits should occur at regular and planned time intervals. The national accreditation body should have the formal authorization to either withdraw or further approve the accreditation for a particular conformity assessment activity.

Recommendation 7: CTT Scoping study

In order to move towards the practical implementation of a CTT process, a scoping study should be carried out to identify the size and scale of activities that are required.

The proposed work procedure for CTT of explosive detection systems is shown in Figure 3.

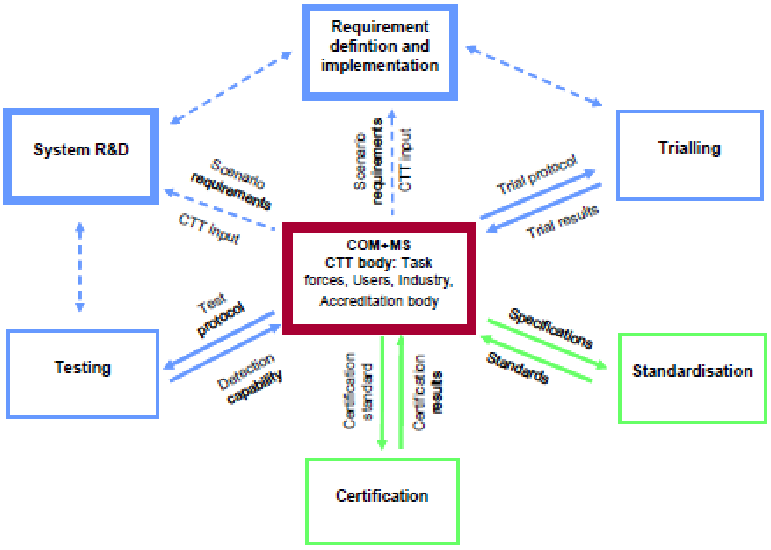

Figure 3 NDE proposal for a possible work procedure for the CTT process [5]

3.2 HECTOS

Within the European FP7 research project HECTOS the harmonisation of evaluation, certification and testing of physical security products was investigated. The HECTOS project focused on the evaluation and certification schemes for physical security products, and studied how existing schemes used in other areas could be applied, adapted or developed for products used for physical security of people, property and infrastructure. HECTOS has identified the current state-of-play and the level of harmonisation across all types of physical security product and has developed a roadmap showing how harmonised European certification systems and schemes could be introduced. The project was active from September 2014 to December 2017.

This paragraph summarizes the HECTOS deliverables, with a focus on Explosives & Weapons (E&W) detection-related issues. Detailed information on the HECTOS results can be found in Annex A and Annex B.

3.2.1 Requirements and state of the art

Hectos deliverable D1.3 “Evaluation and Certification Requirements” [17] identifies stakeholder requirements for physical security product evaluation and certification schemes. It is based on a questionnaire, interviews and a workshop held with a wide range of stakeholders. Input from previous and ongoing work on evaluation and certification schemes in the EU has also been taken into account.

The principal requirements for evaluation and certification schemes that can be generally applicable and accepted across Europe are that there should be:

- Consensus between all key stakeholder groups on key performance requirements, definitions & metrics. Each expressed in sufficient detail.
- Differences in requirements between applications and countries to be taken into account, for example through performance grades, or the use of measurement standards in place of threshold performance requirements.
- Standards, preferably at the international level, setting out the product requirements and test methods, elaborated with the full participation of both user and supplier stakeholders.
- Adequate focus on realistic threats and attacks, which will typically involve human skills and expertise in carrying out tests.
- Sufficient access to standards, as well as signposting and guidance material.
- Consistent evaluation across test houses, through a combination of precision in test methods, mechanisms to identify and correct deficiencies, interlaboratory or 'round robin'.
- Cost and time effective evaluation processes from a choice of test houses, minimising or eliminating unnecessary and repeated tests.
- Rigorous certification, focusing on ensuring consistency of evaluation.
- Rigorous accreditation, focusing on consistency of evaluation over time, and consistency both with and between different member states.
- Recognition of the need for sovereign capability and for security classification at the Member State or European level for some aspects of the standardisation, evaluation and certification chain.

Hectos deliverable D2.1 "Overview of existing standards, gaps in standardization and proposals for standardization activities**"** [18] provides an overview of relevant standards in different product categories on a meta-level. The report identified the following gaps in current standardization activities with respect to explosives:

- Outside of the aviation security application area (where standards tend to cover detection performance only), there is a general lack of detection performance standards (probability of detection vs false alarm rate) and test methods.
- Functional performance can be a function of the overall system configuration as well as/rather than individual components, and the relationship between standards and evaluation at the product component level vs. system level need to be considered.

Furthermore it was concluded that the requirements of particular application areas, such as more stringent security levels demanded by national governments, have led to standards which add additional requirements to those in the European standards and/or more rigorous tests. This limits the degree to which product evaluation and certification to EU standards is considered by end-users to be sufficient as the basis of a European 'quality mark'.

Hectos deliverable D2.2 "Overview of existing certification approaches and common description method" [19] provides a representative but not exhaustive overview of the European Evaluation and Certification (E&C) schemes for physical security products and some interesting E&C schemes beyond that scope. It also gives a short overview of the ISO 17000 standards that are relevant for certification and accreditation.

A "light" gap analysis was done from the perspective of Number of E&C schemes per product category. For E&W Detection there are 2 E&C schemes:

- ECAC CEP. (see also section 3.3) Provides a scheme for laboratory standardized tests of aviation security equipment. It applies to Explosive Detection Systems (EDS), Explosive Detection Systems for Cabin Baggage (EDSCB), Liquid Explosive Detection Systems (LEDS), Security Scanners (SSc), Explosive Trace Detection (ETD) systems, Walk-Through Metal Detectors (WTMD) and Metal Detection Equipment (MDE) for cargo.

- NIJ 0601.03. Specifies minimum performance requirements and methods for testing active WTMDs. It is a voluntary standard and performance tests are typically done as supplier-self-testing, which does not exclude that a manufacturer can contract a recognised test centre to carry out the performance test in order to give more trust to the test results.

The overview of D2.2 served as input for HECTOS WP3, where a harmonized Evaluation and Certification scheme was developed.

3.2.2 Harmonized Certification Scheme Framework and Templates

Deliverable D3.3 "HECTOS Harmonized Security Product Certification Scheme Framework and Templates" [22] provides the proposed HECTOS Harmonized Certification Scheme Framework and Templates for Physical Security Products. The framework is based on the ISO/IEC 17000 Conformity Assessment family of standards, adapted and supplemented by features to support the special requirements of security products. It comprises;

1. a top-level structure and a security specific 'quality mark'
2. certification systems for related product and application areas, and
3. individual certification schemes for evaluation or conformity assessment to specific standards or requirements

The framework also includes important activities, both generic and security specific, to be considered when a scheme is established as well as during scheme maintenance (certification system and scheme management).

A schematic overview of the template for establishing a scheme is shown in Figure 4. The template activities are at high level the following:

I. **Identify scope** – Identify the product and application types to be evaluated and certified.

II. **Identify scheme fundamentals** – Outline and communicate the operating financial model, voluntary or mandatory certification, security classification needs, and the scope of laboratory, realistic and adversarial testing needs.

III. **Identify system structures** – Include schemes for each product type and its standard

IV. **Identify standards** – Identify standardisation organisations' technical committees and working groups or industry associations. Identify need to develop new standards,

V. **Identify detailed requirements –** Determine whether the certification scheme will be a performance measurement or a threshold performance scheme. Identify performance and threshold metrics. Identify possible conflicting requirements and security classification needs.

VI. **Identify test methods –** Adopt or adapt existing methods or develop new test methods and identify classification level.

VII. **Identify scheme structure** – Establish schemes types according to the ISO IEC 17067 definition based on the needs of the overarching system and the scheme. Scheme/system owner(s) and marks of conformity should be identified.

VIII. **Identify laboratory consistency methods** – Identify operator qualification requirements and requirements for accreditation of participating test laboratories Identify and establish laboratory consistency methods

IX. **Identify surveillance methods** – Determine surveillance needs and identify procedures and frequency of surveillance activities. Include validity of certificate.

Annex A contains the example scheme for explosives and weapons detection.

The implementation pathways suggested provides a potential route for moving towards an established evaluation and certification system. Other pathways are possible, and these should be fully elaborated and reviewed by the stakeholders before moving forward.

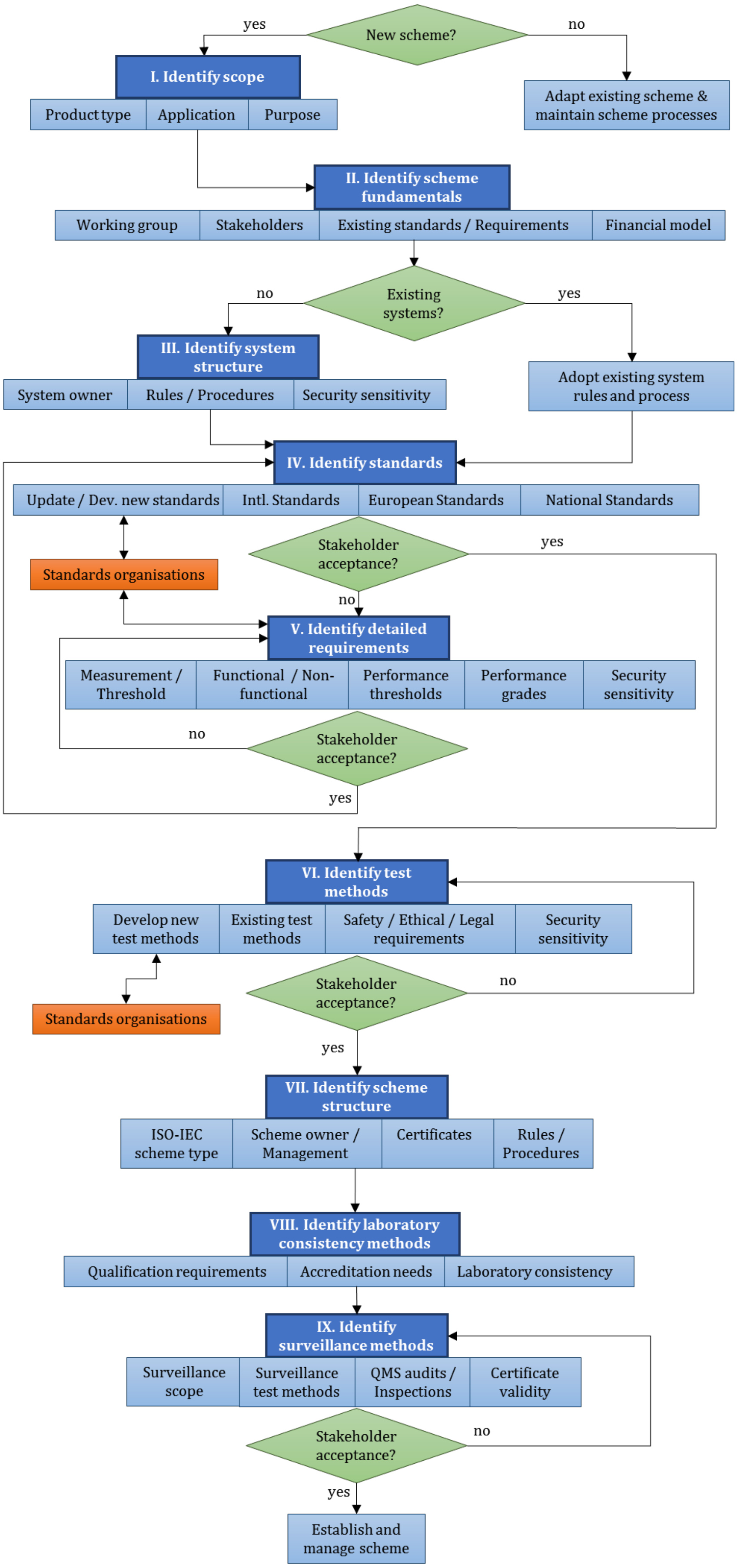

Figure 4 Template flowchart illustrating the steps required in establishing a new evaluation and certification scheme.

A schematic overview of the template for maintaining a scheme is shown in Figure 5.

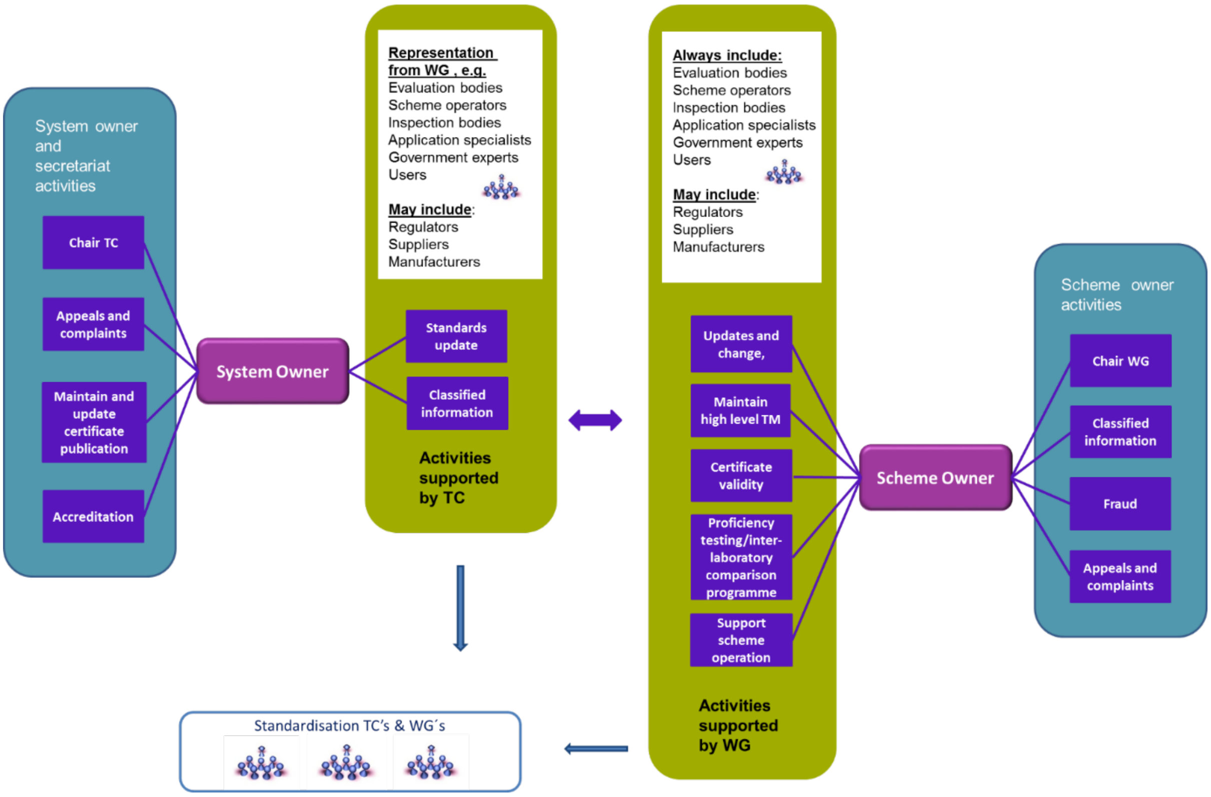

Figure 5 Template for maintaining evaluation and certification systems and schemes.

A complete overview of this framework and template can be found in the CEN-CENELEC Workshop Agreement (CWA) [7] that is based on the HECTOS results.

3.2.3 Conclusions and Roadmap

Hectos deliverable D8.1 “Evaluation and Certification Approaches for Physical Security Products” [23] describes how the HECTOS harmonized certification framework could be applied to several physical security products among which E&W detection equipment.

This deliverable summarizes the historical needs and developments in the field of evaluation and certification for E&W detection equipment and the current international, European and national activities with respect to testing, standards and certification. The document elaborates and verifies the HECTOS certification framework and template for establishing a new certification system and / or schemes, via the case-study (WP5) and the needs of end-users. The template itself is utilized as guide in this process to identify the current maturity with respect to the implementation of standardization and harmonized evaluation and certification schemes, and to provide suggestions on how harmonized schemes could be introduced, identifying activities for scheme functions and features that yet need to be addressed.

Table 1 shows the current state-of-the-art in terms of requirements, standardisation and existing schemes that could form the starting point for the establishment of an EU harmonised E&C scheme for E&W detection equipment. The template elements, together with suggestions for implementation, actions and a foreseen responsible body for implementation, are further detailed in Annex A.

Table 1 Summary of template application for E&W Detection equipment.

Template Activity	Exists	Partially Exists	To Be Initiated
Identify scope	E&W detection products for Aviation security application providing protection for the public.		Non-Aviation applications
Identify scheme fundamentals	Av-Sec: Requirements are described in EU regulation. Manufacturers pay for testing and evaluation		For non-Aviation security, working group of experts should be established. Regulating the use of E&W detection could enlarge the market size, so that raising costs through certification could be covered.
Identify system structure	EU regulation (requirements), ECAC-CEP (testing and evaluation) and certification at national level for Aviation security	Proposal of the EC for establishing a certification system for Aviation security screening equipment.	Certification system for non-Aviation security E&W detection equipment could be based on ECAC-CEP, adapted as necessary to reflect the many differences from Aviation security. System owner could consist of representatives from national CBs. Rules and procedures for confidential information must be implemented
Identify standards	Aviation security requirements are regulatory at European level and de facto "accepted". More stringent measures are required by some MS	-	Performance standards for E&W for non-Aviation security applications have to be developed. Multiple performance grades where applicable
Identify detailed requirements	Aviation security: conformity assessment against classified detection rate requirements, with additional MSM at national level	-	Non-Aviation security: Identifying requirements (either threshold performance or performance measurement requirements) is complex due to last variety in applications, threats, amounts and – if applicable – thresholds. Can be similar to Aviation security.
Identify test methods	ECAC-CEP Common Testing Methodologies (CTM) for Aviation security	-	Non-Aviation security: Similar to ECAC-CEP, including the solid statistical base, but less restrictive with respect to classification level.
Identify scheme structure	Aviation security: ECAC-CEP and the national authorities of the member states. Scheme type 1a	-	Non-Aviation security: Preferably scheme type 5. EBs involved in ECAC-CEP are suited to be EBs for non-Aviation security T&E. Certificates / marks provide all relevant data.
Identify laboratory consistency methods	Aviation security: actually no proficiency testing but study groups perform peer review of test-centres.	-	Proficiency testing by interlaboratory comparisons is practically hard to achieve. Laboratory consistencies can also be obtained by regular inter-lab visits (peer review).

Template Activity	Exists	Partially Exists	To Be Initiated
Identify surveillance methods	EU Regulation prescribes surveillance, but no official procedure installed.	National surveillance initiatives ongoing. ECAC study groups are implementing surveillance.	Aviation security methods can be the base for non-aviation application. Validity of certificate must be well defined.

It is concluded that currently, the evaluation and certification of E&W detection equipment can be divided into two parts: (i) a regulated, harmonized evaluation system for Aviation security with certification on a national base and (ii) a yet to be initiated evaluation and certification system for non-Aviation security applications.

The ECAC system represents well-established threshold performance schemes for detection equipment. The EU has recently established a Union certification system for aviation security screening equipment which uses the results of the ECAC evaluation system.

For non-aviation security applications a different system will be needed and that is far from implementation yet. The demand for the development of a certification scheme for E&W detection equipment is low. The lack of performance measurement standards for these applications is the main obstacle for implementation. However, given the wide range of applications, with small markets and differing requirements, performance measurement schemes are probably the most effective way forward.

Deliverable D8.2 “Elements for roadmap on European certification, accreditation and standardization for physical security products” [24]is the final deliverable of HECTOS and presents a roadmap that shows a possible way to implement the proposed framework for certification and evaluation of physical security products on a long-scale time frame.

The roadmap uses three main perspectives: the strategic perspective (Why is a particular activity to be done?), the functional perspective (What has to be done in a particular activity?) and the resource perspective (How does a particular activity to be performed?).

On the Functional perspective, two types of roadmap elements are considered:

1. Roadmap elements describing generic preparatory actions that need to be done to be able to implement the overall harmonized European physical security product certification framework structure (Enabling Infrastructure Roadmap)
2. Roadmap elements describing actions that need to be taken to implement, apply and/or maintain certification systems and schemes for some specific product and application categories (System Roadmaps)

The enabling infrastructure roadmap is given in Figure 6 and comprises a number of roadmap elements from dissemination and awareness building of the proposed concept through its piloting to the expansion to various physical security certification systems. Explanation of the roadmap elements is given in Annex B.

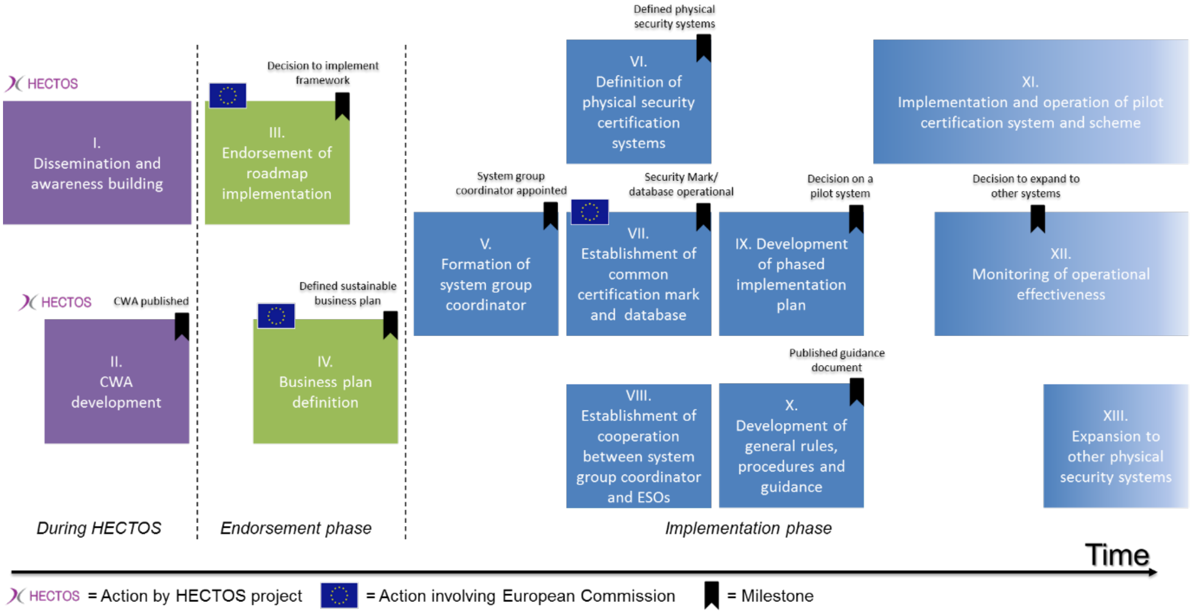
HECTOS
I.
Dissemination and awareness building
Decision to implement framework
III.
Endorsement of roadmap implementation
Defined physical security systems
VI.
Definition of physical security certification systems
XI.
Implementation and operation of pilot certification system and scheme
System group coordinator appointed
Security Mark/ database operational
Decision on a pilot system
Decision to expand to other systems
V.
Formation of system group coordinator
VII.
Establishment of common certification mark and database
IX. Development of phased implementation plan
XII.
Monitoring of operational effectiveness
HECTOS
CWA published
II.
CWA development
Defined sustainable business plan
IV.
Business plan definition
Published guidance document
VIII.
Establishment of cooperation between system group coordinator and ESOs
X.
Development of general rules, procedures and guidance
XIII.
Expansion to other physical security systems
During HECTOS
Endorsement phase
Implementation phase
Time
HECTOS = Action by HECTOS project
= Action involving European Commission
= Milestone

Figure 6 Visualization of roadmap elements Enabling Infrastructure

The system roadmaps describe the highlights of the way ahead towards an implementation into the proposed harmonized European certification framework. Each of these system roadmaps is identifying the status quo with respect to the implementation of a system / scheme and the expected complexity / maturity for each of the template elements. In order to cover as many template steps as possible, it was assumed during that a *Type 5 threshold performance scheme* had to be implemented, i.e. a scheme where certification is based on meeting a certain threshold performance and including surveillance.

Figure 7 summarizes the highlights for the system roadmap for E&W detection equipment for Aviation security application. The rationale behind the status quo and the expected complexity is explained in Table 2.

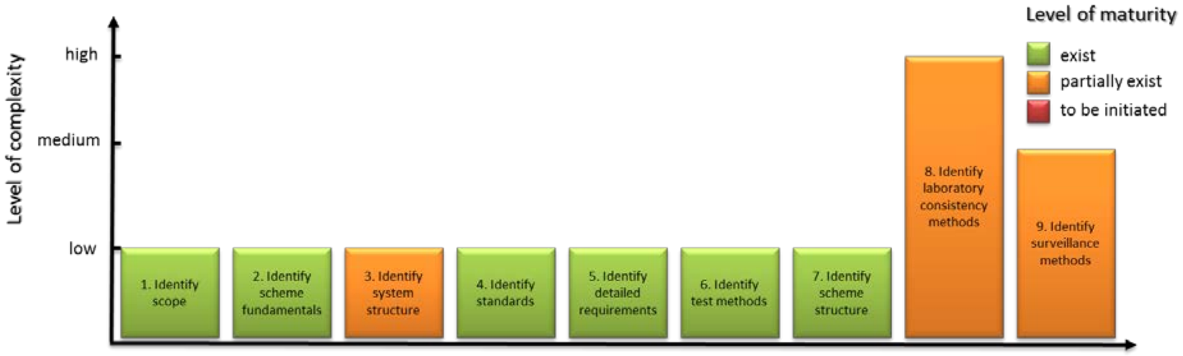

Figure 7 Highlights for roadmap system E&W detection, Aviation security

Table 2 Rationale behind the status quo and the expected complexity for E&W detection, Aviation security

1. Identify scope	ECAC schemes in place. No further action needed.
2. Identify scheme fundamentals	ECAC schemes in place. No further action needed.
3. Identify system structure	System owner, management functions, rules and procedures must be defined yet. A European certification system based on the ECAC CEP will be installed. This might be adapted to the ISO 17000-series to be comparable to other evaluation systems. The system owner, management functions, rules and procedures for a combined explosive & weapons detection system with both Aviation security and non-Aviation security schemes is yet to be defined though. Since it will rely on system management rules etc. from the ECAC CEP system, no complications are expected.
4. Identify standards	ECAC schemes in place. No further action needed.
5. Identify detailed requirements	ECAC schemes in place. No further action needed.
6. Identify test methods	ECAC schemes in place. No further action needed.
7. Identify scheme structure	ECAC schemes in place. No further action needed.
8. Identify laboratory consistency methods	Under development in ECAC scheme. Some E&W detection equipment is large and fragile and not built for transporting and installing on a regular base. Moreover, testing of Aviation security equipment is generally expensive. Therefore, frequently installing and disassembling the same machine in one (intralab) or more (interlab) labs for proficiency testing is practically and economically not achievable and currently not done. However, consistency of test results should be determined within the same laboratory over time as well as between different laboratories. A proficiency test protocol should be developed for each scheme. A standard test piece is a possible way forward for proficiency tests. Each evaluation body should have the same test piece and during the evaluation of equipment this test piece is scanned. The scans are a benchmark which can be used to assess differences between test laboratories and over time within a laboratory. Additionally, laboratory consistencies can also be supported by regular inter-lab visits of evaluation body representatives during testing to learn from each other and to assure that tests are performed correctly and consistently.
9. Identify surveillance methods	Is done at national level. Neither surveillance of production scope and QMS nor surveillance according to ISO/IEC definitions stating production conformity of new samples taken from the market is currently part of the ECAC scheme. Surveillance needs for explosives and weapons detection equipment for Aviation security must be determined and test methods should be included in the new scheme. However, it must be discussed with all stakeholders which party or which parties bear the cost of such a surveillance program.

Even though the aviation security is the main application area, equipment for explosives and weapons detection is broadly used in various other application areas. The market is divided reaching from handheld explosives detection devices for first responders and police to stationary portals and X-ray machines for E&W detection in the protection of critical infrastructure or large events. This leads to widely differing requirements and until now there is no harmonized certification scheme in place. Furthermore, contrary to Aviation security, performance requirements for non-Aviation security applications are not legally binding and only few national standards and test methods exist.

Figure 8 summarizes the highlights for the system roadmap for E&W detection equipment for non-Aviation security application. The rationale behind the status quo and the expected complexity is explained in Table 3.

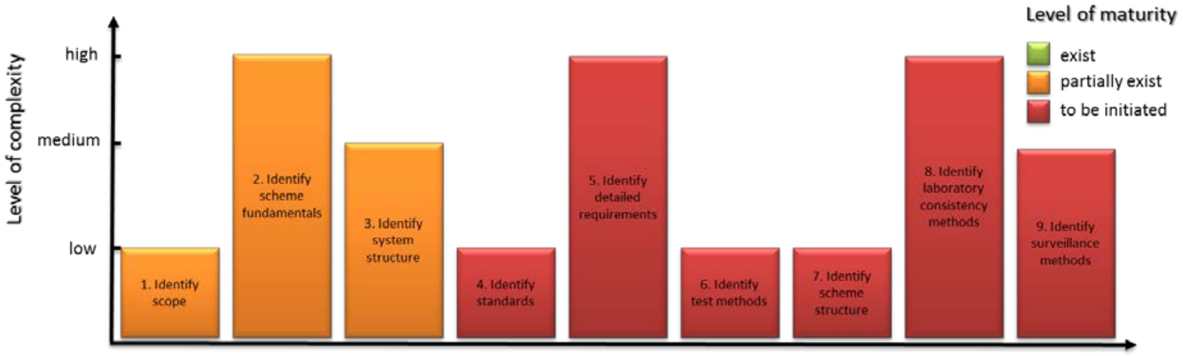

Figure 8 Highlights for roadmap system E&W detection, non-Aviation security

Table 3 Rationale behind the status quo and the expected complexity for E&W detection, Aviation security

1. Identify scope	Wide range of technologies and application areas. First activities have been started. The landscape of products and applications for Non-Aviation security is well known. Some discussion is expected to identify the exact purpose of the scheme(s): e.g. to meet performance requirements, or to provide certified performance information to end-users.
2. Identify scheme fundamentals	Some non-EU standards exist. Scheme and structure could be adopted from the ECAC-CEP. A broad stakeholder group exists (regulators, manufacturers, law enforcement, users, the public) and first activities have been started. However, establishing a working group in which all stakeholders feel well represented might form the largest challenge in identifying the scheme fundamentals for non-Aviation security applications. Furthermore, testing and certification of E&W equipment is complex and expensive, so the financial model is crucial in this process.
3. Identify system structure	The system owner, management functions, rules and procedures (including for handling of classified requirements, test methods and data) for a combined explosive & weapons detection system with both Aviation security and non-Aviation security schemes is yet to be defined. Although it may rely on system management rules etc. from the ECAC CEP system, some complications can be expected because of the wide variety of non-Aviation security products and applications and because Aviation security is regulated and non-Aviation security may not be regulated.
4. Identify standards	Since no standards exist for non-Aviation security applications, the need for development and harmonization should be accepted by stakeholders. Fear for over-regulation that may become an administrative and financial burden must be overcome.
5. Identify detailed requirements	For non-Aviation security a performance measurement scheme for application based certification seems the most promising way forward since the various application areas lead to various requirements regarding threats, amounts and thresholds, which are not likely to be defined to that extent. Furthermore, harmonization of requirements is complicated due to different national perspectives. However, if a (partial) performance threshold scheme is implemented for (certain) non-Aviation security applications, e.g. because of a mandate by the EC, this step will be even more challenging. In both cases, quite some work has to be done in identifying requirements (either threshold performance or performance measurement requirements) and this is considered as one of the most complex steps in the scheme implementation process.

6. Identify test methods	Once the requirements are identified it is expected to be less complex to develop test methods. The ECAC common test methods for Aviation security would form a good, validated base for non-Aviation security test methods. For each product type, a process is needed to determine whether the proposed test method is suitable or should be adjusted (and how). The test method should be comprehensive and include all possible parameters that may be needed for certification. The test method should include these levels of granularity with sufficient statistical confidence. Classification levels for non-Aviation security applications will be less restrictive than for Aviation security applications.
7. Identify scheme structure	No complications foreseen for scheme structure identification for non-Aviation security applications: a possible way is to follow the ECAC CEP scheme and that the scheme is managed by a central European authority with representatives from national (governmental) certification bodies because of the confidential nature and the societal relevance of security. The system management functions, rules and procedures should be established by a management group must be legally sound and accepted by the participating members. Identification of scheme certificate and mark information is straight forward. Given the required expertise and dedicated facilities, the evaluation bodies involved in ECAC-CEP are suited to take over the role for non-Aviation security testing and evaluation.
8. Identify laboratory consistency methods	Development of laboratory consistency methods is very challenging for security equipment. Proficiency testing by interlaboratory comparisons is practically hard to achieve. Laboratory consistency can also be reached by regular inter-lab visits (peer review). See also same step for Aviation security applications
9. Identify surveillance methods	Surveillance needs for explosives and weapons detection equipment for non-Aviation security must be determined and test methods should be included in the new scheme. It could be based on Aviation security surveillance methods which are expected to be developed earlier. Technically, there is no complexity expected. However, it must be discussed with all stakeholders which party or which parties bear the cost of such a surveillance program. Validity of certificate must be well defined for all different products and applications.

The following conclusions were drawn for Explosives and Weapon Detection:

- A harmonized EU certification system for E&W detection equipment for aviation security is almost established. Even though the ECAC CEP is not based on EN or ISO standards it represents the basis to implement the certification regulated in EC 2015/1998. For further development it should be adapted with instruments of the ISO 17000 series. Methods to guarantee laboratory consistency and means of surveillance should be implemented and might be challenging. Establishing a European certificate could be a benefit for European manufacturers even for markets outside the EU;

- The E&C system for non-aviation security is the least mature system and expected to be the most complex to implement. The main barrier for implementation of the proposed harmonized European certification framework is the diverse range of requirements (either threshold performance or performance measurement requirements) because of the wide range of applications. Harmonization of these requirements among countries is very challenging and will require much effort and time. The second barrier is the fact, that the mitigation of a threat caused by an attack with weapons or explosives is seen as a national security issue. The willingness to give up national points of view is therefore low. The development of harmonized evaluation standards and the introduction of laboratory consistency methods could be a way forward to enhance the trust in evaluation results in this area.

3.2.4 HECTOS Outlook

Deliverable D8.2 [24] ends with a general *post-HECTOS outlook*, which is partly copied here:

"This roadmap can build the starting point for the implementation of the harmonized European certification framework proposed by HECTOS. This explicitly does not mean that the implementation process cannot be performed differently. The presented top-down concept is an approach where the system group coordinator takes early responsibility of the framework and its implementation, followed by a pilot case and expansion to other products. This is however only one approach out of multiple possible options. Nevertheless, during the course of the project, the HECTOS partners came to the conclusion that the approach presented is a viable way forward considering the risks and opportunities linked to the framework.

Most of the major steps towards the proposed harmonized European certification framework are yet to be initiated. The HECTOS deliverables D3.3, D8.1, D8.2 and the CWA – "Guidelines on evaluation systems and schemes for physical security products", in particular, need to be taken into account in any future activities since they provide the foundation for the framework. The approach described here requires an independent European authority, preferably the European Commission to drive forward the idea of the harmonized European certification framework. The framework could be initiated through legislation, or by building a consensus amongst the existing stakeholders. CEN/CENELEC which owns the Keymark certification system at present or IEC could be other potential candidates for this role. A workshop should be initiated as proposed in III Endorsement of roadmap implementation (see Figure 3). This could build a discussion platform used to sense the willingness of stakeholders to actively drive forward the concept.

If it is not possible to gain the consensus or political will to establish the framework in the top-down manner suggested here, an alternative bottom-up (or that it grows from top-down and bottom-up simultaneously) approach should be considered, for example a pilot scheme may be implemented without the need of a system group coordinator. In this context a particular system could take up the suggested framework on small scale and demonstrate its viability. Particular elements of the framework architecture could be extracted and implemented step by step. Like this the framework could grow organically. This is less attractive than the approach described in the roadmap, since the rules and procedures chosen for the pilot system may not be completely suitable for certification of other types of product."

3.3 ECAC: aviation security equipment certification

Aviation security is regulated all over the world to ensure security and safety on board civil airplanes. In Europe the EU issues performance standards for security equipment, which are mandatory for all EU member states. It was and still is up to the member states authorities to implement the performance standards and to ascertain the compliance of aviation security equipment with the performance standards at their airports. In the early years of this millennium this led to the salutation of different testing regimes in different EU member states, which potentially could lead to a difference in security level. There was an obvious need for standardised test methods.

The European Civil Aviation Conference (ECAC), founded in 1955, is an intergovernmental organization and seeks to harmonize civil aviation policies and practices amongst its member states and, at the same time, promote understanding on policy matters between its Member States and other parts of the world. It currently has 44 member states, including all 27 European Union member states. Security is one of the three strategic priorities of ECAC, and represents a key area of ECAC activities. Within ECAC, activities started to create standardized test methods, called 'Common Testing Methodologies' (CTM) and a framework for test execution, called the Common Evaluation Process of security equipment (CEP). Currently there are CTM's in place for Explosive Detection Systems for Hold Baggage (EDS), Explosive Detection Systems for Cabin Baggage (EDSCB), Explosive Trace Detection systems (ETD), Liquid Explosive Detection Systems (LEDS), Security Scanners (SSc), Walk Through Metal Detectors (WTMD) and Metal Detection Equipment for cargo (MDE).

3.3.1 European Regulatory Framework

In European legislation a distinction is made between 'regulations', 'directives', 'decisions', 'recommendations' and 'opinions'. In this report the word 'regulation' also implies all other legally binding forms of European legislation, such as 'decisions'.

The European legislative framework on air cargo and mail security is defined by Regulation (EC) No. 300/2008 of 11 March 2008 which sets out common rules in the field of civil aviation security**.** It provides the basis for a common interpretation of Annex 17 to the Chicago Convention and lays down the basic principles of what has to be done in order to safeguard civil aviation against acts of unlawful interference. The structure of EC Regulation 300/2008 is shown in Figure 9. It consists of a main part and an Annex consisting of 12 chapters. This regulation is amended once in 2010.

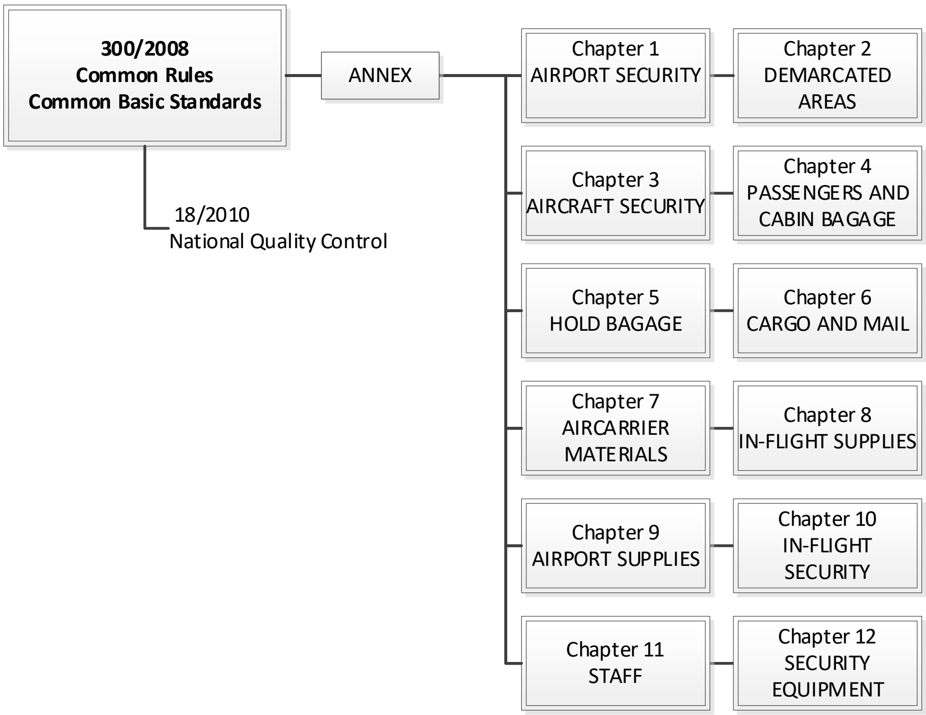

Figure 9 EU Regulation 300/2008

EU Regulation 300/2008 is very generic. It is supplemented by EU regulation 272/2009 **[ref]**This regulation specifies the generic terms of EU regulation 300/2008. The structure of EC Regulation 272/2009 is shown in Figure 10.

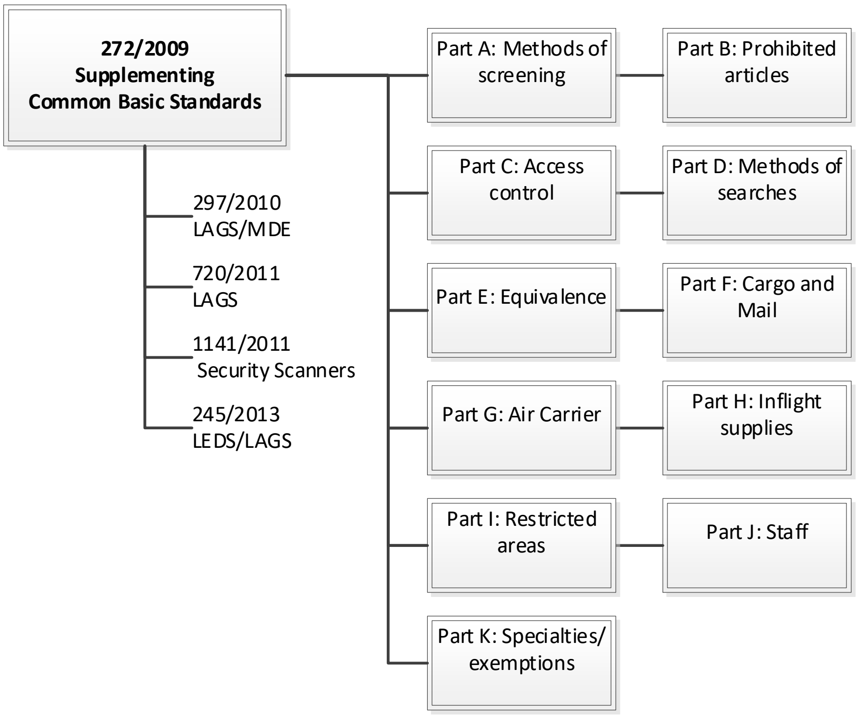

Figure 10 EU Regulation 272/2009

Though EU regulation 272/2009 is more specific than EU regulation 300/2008, it is not specific enough for implementation. For that purpose EU regulation 2015/1998 and EU decision C(2015) 8005 have been installed. EU regulation 2015/1998 is the unclassified part and decision C(2015) 8005 is the security sensitive part. The structure of EU regulation 2015/1998 and EU decision C(2015) 8005 follows that of EU regulation 300/2008 and is shown in Figure 11 (security sensitive performance standards are indicated in yellow).

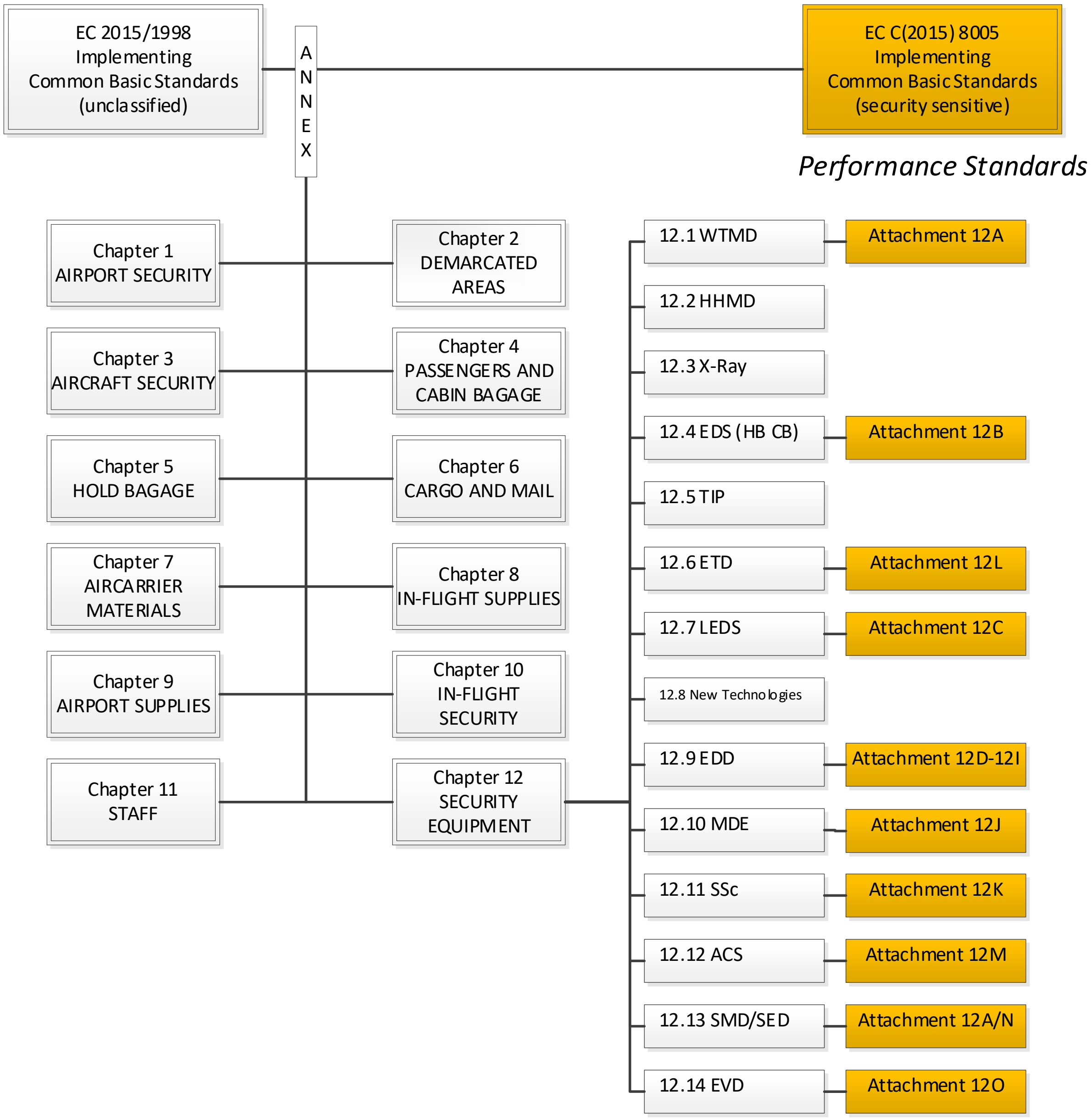

Figure 11 EU regulation 2015/1998 and EU Decision C(2015) 8005

3.3.2 ECAC Aviation security related activities

The activities of ECAC in the field of aviation security is organised as shown in Figure 12.

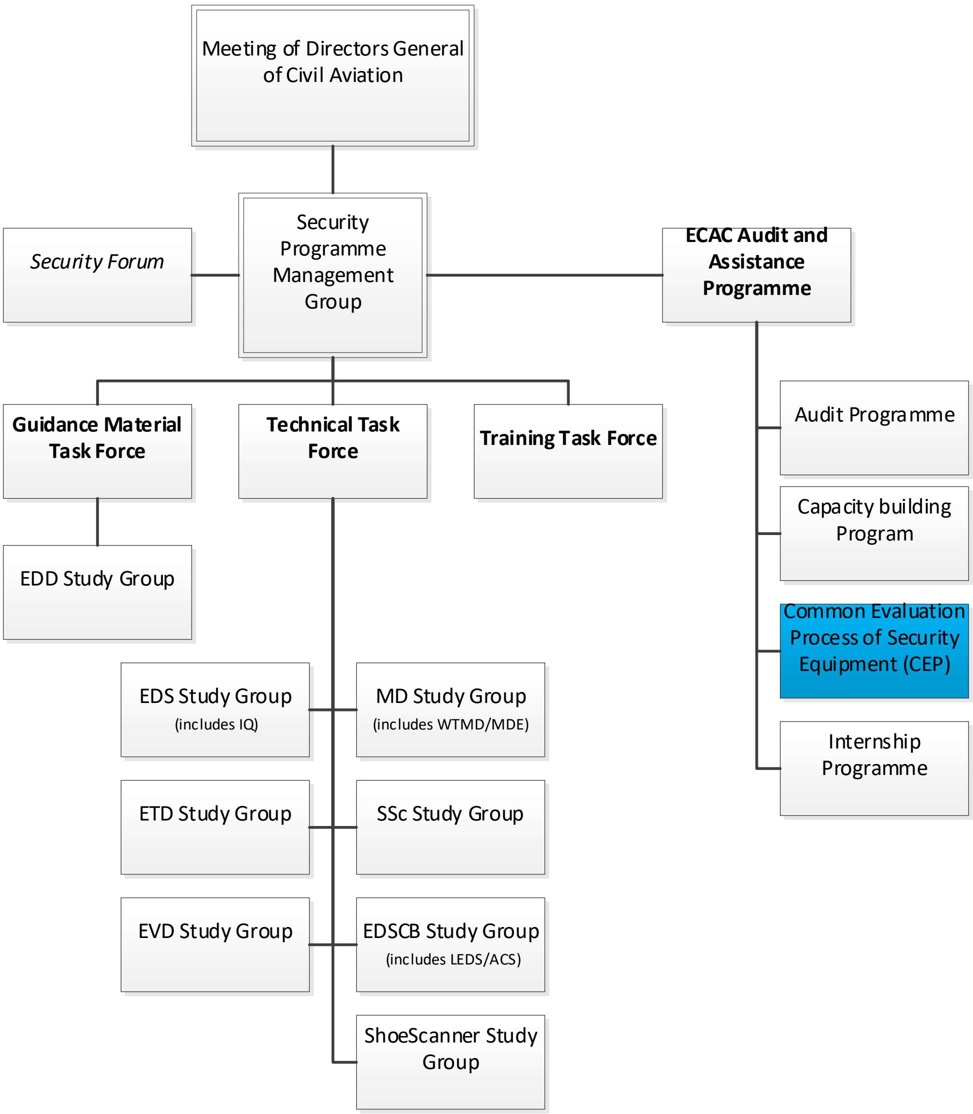
Meeting of Directors General of Civil Aviation
Security Forum
Security Programme Management Group
ECAC Audit and Assistance Programme
Guidance Material Task Force
Technical Task Force
Training Task Force
EDD Study Group
Audit Programme
Capacity building Program
Common Evaluation Process of Security Equipment (CEP)
Internship Programme
EDS Study Group (includes IQ)
MD Study Group (includes WTMD/MDE)
ETD Study Group
SSc Study Group
EVD Study Group
EDSCB Study Group (includes LEDS/ACS)
ShoeScanner Study Group

Figure 12 Organisation of ECAC activities in the field of aviation security

The development of CTMs is done in the study groups under the Technical Task Force (TTF). The TTF consists of members states authorities responsible for aviation security and Subject Matter Experts (SMEs). Not all ECAC members states contribute to the TTF. Once prepared, the CTM is discussed in the TTF and endorsed by the TTF after approval. After endorsement by the Security Programme Management Group where the member states authorities are represented, a CTM is adopted by the Director Generals of the member state authorities. After that, the CTM is in force and can be used within the CEP. CTMs are updated on a regular basis.

3.3.3 ECAC CEP

Testing according to the CTM is executed within the framework of the ECAC Common Evaluation Process. Members state authorities can appoint test centres (TC) for testing of aviation security equipment. To be eligible as TC a (potential) TC must comply with certain criteria, with respect to quality and safety, which are laid down in an internal ECAC document.

Currently (December 2022) six Test Centres are participating in the CEP, covering one or more security equipment categories depending on their facilities and resources:

1. Defence Science and Technology Laboratory (DSTL), United Kingdom, for EDS and ETD.
2. Fraunhofer Institut für Chemische Technologie (ICT), Germany, for EDS, EDSCB, ETD and LEDS.

3. Forschung- und Erprobungsstelle der Bundespolizei (Federal Police Technology Centre**)** in cooperation with Fraunhofer ICT Energetic Materials - EM, Germany, for EDS, SSc and WTMD.
4. Instituto Nacional de Técnica Aeroespacial (INTA), Spain, for ETD and SSc.
5. Service Technique de l'Aviation Civile (STAC), France, for EDS, EDSCB, ETD, MDE and WTMD.
6. The Netherlands Organisation for Applied Scientific Research (TNO), Netherlands, for EDS, EDSCB, ETD, LEDS and SSc.

The CEP is managed by the CEP Management Group (CEP MG), consisting of representatives of the TCs and authorities from their member states. The main tasks are the distribution of test requests from aviation security equipment manufacturers to the TCs, endorsement of the reports with the test results and maintaining and guaranteeing the quality of the tests, like test consistency between TCs. The CEP MG is supported by the ECAC secretariat and a separate quality study group.

Figure 13 shows the CEP process where the parties involved are indicated by the orange, rounded boxes. It starts with a request from a manufacturer for a test of an aviation security system. This request is processed by the ECAC secretariat for eligibility and send to the ECA CEP MG. The CEP MG allocates the test to a TC based on available capacity and based on a rotation principle to avoid that one manufacturer is tested by one TC only. The TC has a contract with the manufacturer on executing the test, agreeing on cost, lead time and legal conditions. After executing the test, which typically takes 2 to 3 months, according to the CTM drawn up by the TTF[1], standardised reports containing the test results are made by the TC. The CTM is classified and not open to the manufacturer, though an unclassified summary is available to them, The reports are also classified and contain information on compliance with the applicable standard and detailed results on the detection performance of the system. The reports are not shared with the manufacturer, but the reports are sent to the CEP MG for endorsement. The manufacturer is debriefed on the results. The debrief is standardised as well, in order to establish that a manufacturer receives the same information, whichever TC is executing the test. The debrief is done orally and provides the manufacturer with information on compliance with the standard and unclassed, high level information on the detection performance of the system. Finally, depending on whether or not a system is compliant with a standard. The results are distributed. On the ECAC website[2] a list is available of all aviation security equipment that meets a standard. It contains a detailed description of the system, but no detection performance information. The reports with the results are send to the appropriate authorities of the member states. Based on these reports, the member state authorities can certify equipment for use at airports throughout their country. Such approval and certification is hence the responsibility of the appropriate authority in each ECAC Member State and is not done by ECAC. Members states have the prerogative to impose more stringent measures (i.e. requirements above and beyond the EU performance standard).

While it is evidently the aim of the CEP to provide a harmonised evaluation of different categories of security equipment, it is only applied to a limited number or categories of equipment and technologies (aviation security based) and does not provide for a common European-wide certification programme or for direct enforced mutual recognition of equipment certified at a national level, neither does it provide for conformity assessment (or certification) beyond the aviation sector. The CEP is however recognised by several non-ECAC States (e.g. Australia, Canada, USA).

[1] Actually by the Study Groups under the TTF. The TTF however, endorses the CTMs before they come into force.

[2] https://www.ecac-ceac.org/activities/security/common-evaluation-process-cep-of-security-equipment

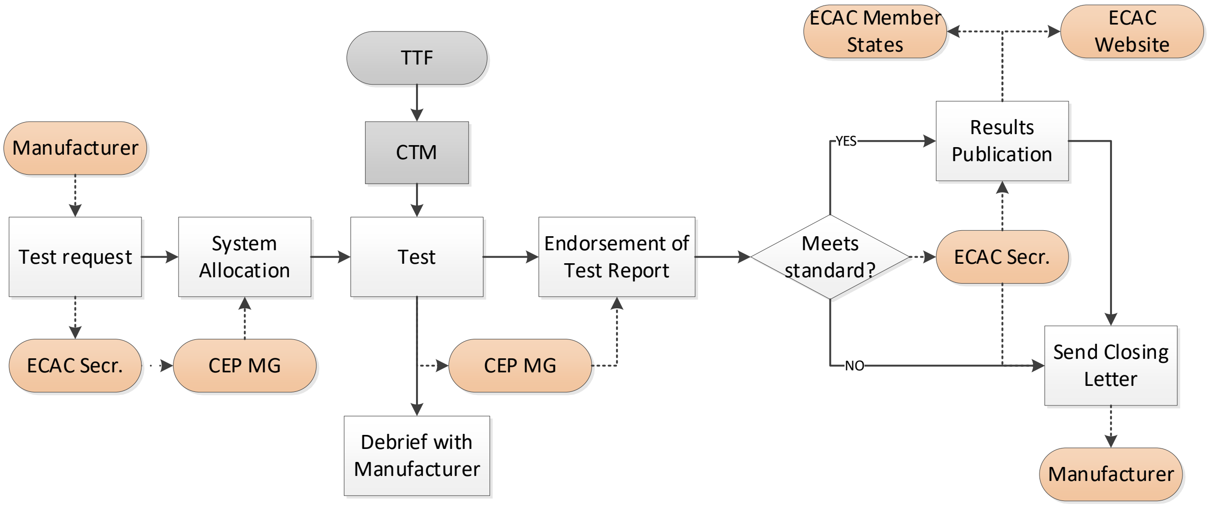

Figure 13 The ECAC CEP process

In summary, the aviation security equipment domain is highly regulated in Europe, and is a combination of mandatory performance standards and voluntary test standards. The test execution is organised such that test results are trustworthy and of high quality. Recognition of the ECAC CEP process by the ECAC members states ensures a consistent minimum security level for aviation security throughout the ECAC member states, ensuring compliance with EU performance standards, and provides a one-stop-shop for manufacturers who want the enter the European market.

3.4 CEN/ISO initiatives in the field of security of explosives

The European Committee for Standardization is one of three European Standardization Organizations (together with CENELEC and ETSI) that have been officially recognized by the European Union and by the European Free Trade Association (EFTA) as being responsible for developing and defining voluntary standards at European level.

The standardization system in Europe is based on the national pillars, which are the National Standardization Bodies or the members of CEN. A National Standardization Body is the one stop shop for all stakeholders and is the main focal point of access to the concerted system, which comprises regional (European) and international (ISO) standardization. It is the responsibility of the CEN National Members to implement European Standards as national standards. The National Standardization Bodies distribute and sell the implemented European Standard and have to withdraw any conflicting national standards.

The standardization activities of CEN are steered by the CEN Technical Board, who has full responsibility for the execution of CEN's work programme. Standards are prepared by Technical Committees (TCs). Each TC has its own field of operation (scope) within which a work programme of identified standards is developed and executed. TCs work on the basis of national participation by the CEN Members, where delegates represent their respective national point of view. This principle allows the TCs to take balanced decisions that reflect a wide consensus.

The real standards development is undertaken by Working Groups (WGs) where experts, appointed by the CEN Members but speaking in a personal capacity, come together and develop a draft that will become the future standard. This reflects an embedded principle of 'direct participation' in the standardization activities, see for example the HECTOS CWA in section 3.2.2.

Workshops are particularly relevant in emerging or rapidly-changing technologies that require quickly-developed specifications or results of research projects. They produce CEN and/or CENELEC Workshop Agreements (CWAs).

ISO is an independent, non-governmental international organization with a membership of 167 national standards bodies.

Annex C contains a list of TCs working in fields related to the security of explosives and related domains as safety. It is classified to the four domains prevent, detect, mitigate and react.

3.5 ERNCIP

The European Reference Network for Critical Infrastructure Protection (ERNCIP) project is coordinated by the EC-Joint Research Centre (JRC).

"ERNCIP aims at providing a framework within which experimental facilities and laboratories will share knowledge and expertise in order to harmonise test protocols throughout Europe, leading to better protection of critical infrastructures against all types of threats and hazards.

Our mission is to foster the emergence of innovative, qualified, efficient and competitive security solutions, through the networking of European experimental capabilities.

ERNCIP is a direct response to the lack of harmonised EU-wide testing or certification for CIP products and services, which is a barrier to future development and market acceptance of security solutions.

IPSC, under the mandate of the DG Home, in the context of the European Programme for Critical Infrastructure Protection (EPCIP), and with the agreement of Member States, set up the ERNCIP project in 2009. The preparatory phase was successfully completed in November 2010 and the project started its implementation phase in 2011." [8]

ERNCIP has several thematic groups, four of which are relevant for the security of explosives:

1. DEWSL group Detection of Explosives & Weapons at Secure Locations
2. BUILDINGS group on Resistance of Structures to Explosion Effects
3. AVIATION SECURITY group on Aviation Security Detection Equipment
4. DEMON group on Explosives Detection Equipment (non-Aviation)

3.5.1 DEWSL thematic group

On the ERNCIP website [9] the challenge is described as follows:

"There are no technical specification and performance requirement standards for explosive and weapons detection equipment and security screening processes used in non-aviation fields. One reason is the variations in the needs of the different "non-aviation" environments, which makes harmonisation very difficult. As a consequence, it has not been possible to propose a single scheme at EU level for the certification, testing and trialling of equipment used for detecting explosives and weapons outside of airports."

The focus of work the DEWSL group is:

"In 2015, the TG investigated the operators needs for explosives detection at locations that have a secure perimeter, such as government buildings; industrial locations; nuclear sites, ports, and major event venues. The TG developed a set of recommendations that were validated through a consultation workshop, with the priorities being identified as:

- development of guidelines for people and possessions screening operations;
- development of guidelines for vehicle screening operations;
- development of training courses and materials for people and possessions screening operations;
- development of training courses and materials for vehicle screening operations;
- research into new techniques and technologies for cost-effective and proportionate vehicle screening."

The DESWL thematic group produced three deliverables:

1. ERNCIP Detection of Explosives and Weapons in Secure Locations (DEWSL) Final Report Phase 1, April 2018
2. User Needs for Detection of Explosives and Weapons at High Throughput Locations, April 2018
3. Research Needs for Detection of Explosives and Weapons at High Throughput Locations, April 2018

The status of the work of the DEWSL group is currently on hold.

3.5.2 BUILDINGS thematic group

On the ERNCIP website [10] the challenge is described as follows:

"The resistance of civil buildings and building elements against explosive effects has only been considered in the last decade and consequently only now being understood by governments and society. For this reason the number of regulations available is very limited, and, consequently, there is no harmonised system of testing the elements. The same goes for dynamic numerical test methods where, in general, no regulations or accepted guidelines have been established. While there is a lot of testing experience in individual facilities and laboratories, each facility has its own testing methods, and there are a very limited number of published harmonised experimental procedures. In addition, the procedures for a proper risk assessment in the field of blast loaded structures is missing that could help to identify the possible need of protection of a particular structure depending on vulnerability, target value and further criteria."

The focus of work the BUILDINGS group is:

" The first goal of the TG is to support pre-standardisation to improve test procedures in the testing of structural elements against explosion-induced loads. While the testing of structures by shock-tubes was discussed in the group in the past and a valuable support was given already to the standardisation bodies, the group is discussing now in detail the loading by arena testing.

The second goal is to develop a clear procedure for the risk assessment for buildings concerning explosions and further malicious events. The objective is to support the development of an appropriate standardisation concerning the question, in which cases blast protection measures should be considered."

The BUILDINGS thematic group produced six deliverables:

1. Suggestions for adaptations of existing European norms for testing the resistance of windows and glazed façades to explosive effects, April 2018
2. A set of essential requirements towards standardising the numerical simulation of blast-loaded windows and facades April 2016
3. Recommendations for the improvement of existing European norms for testing the resistance of windows and glazed façades to explosive effects, December 2015
4. Numerical simulations for classification of blast loaded laminated glass possibilities limitations, May 2015
5. A comparison of existing standards for testing blast resistant glazing and windows, May 2015
6. Resistance of structures to explosion effects Review report of testing methods, May 2014

The status of the work of the BUILDINGS group is currently in progress, though latest reported activities are from 2016.

3.5.3 AVIATION SECURITY thematic group

On the ERNCIP website [11] the challenge is described as follows:

”The European Commission is defining legally binding technical specifications and performance requirement standards for various types of detection equipment used at EU airports. The introduction of eligible instruments and performance standards in EU legislation calls for European common testing methodologies (CTMs) for detection equipment, to facilitate mutual recognition of approved or certified equipment. The challenges associated with the EU Regulation are that there are no standard approval procedures in the EU for aviation detection equipment, with diverse security equipment standards at Member State level.

Consequently, a common EU certification, testing and trialling scheme for aviation security equipment is required. The European Commission is studying the feasibility of a regulation laying down rules on the organisation and operation of accreditation of conformity assessment bodies for aviation security. As the conformity testing is envisaged to be carried out at several accredited test centres in EU Member States, a test centre quality system will be required.”

The focus of work the AVIATION SECURITY group is:

” Focus of the Thematic Group was on the aviation sub-sector, with activities covering:

- Technical specifications and detection requirements
- Common testing methodologies (CTM)
- Development of an EU certification system
- Technical exchanges with third countries and international organisations.”

The AVIATION SECURITY thematic group produced two deliverables:

1. Technical Considerations on Explosives Trace Detection in EU Legislation (JRC85509), September 2014
2. Detection Requirements and Testing Methodologies for Aviation Security Screening Devices in the EU and EFTA (JRC81650), September 2014.

The status of the work of the AVIATION SECURITY group is completed.

3.5.4 DEMON thematic group

On the ERNCIP website [12] the challenge is described as follows:

” Since the 2006 transatlantic aircraft plot, the EU has defined legally binding technical specifications and performance requirement standards for various types of detection equipment used in EU airports, which call for European Common Testing Methodologies (CTMs) for detection equipment, to facilitate mutual recognition of approved or certified equipment. However, this kind of arrangement is not yet at the same maturity level for the detection of explosives outside the framework of aviation security e.g. for mass transport, special events, crowded places. There are different needs among the stakeholders, which hinders harmonisation, and so it is currently not possible to propose a single scheme for the certification, testing and trialling of explosive detection equipment outside of aviation.”

The focus of work the DEMON group is:

” Although definition of a common CTM for non-aviation security would be, at the moment, a too-challenging task for the ERNCIP TG, a common methodology that would evaluate the capabilities of the detection equipment (e.g. does it detect explosives?) and check the claims of manufacturers would be helpful, as it would provide an indicator to the potential of detection systems.”

The DEMON thematic group produced two deliverables:

1. Statement of User Needs Final Report, December 2014
2. State of the Art Report on European Legislation relating to Explosives and Explosive Detection System for non-aviation configurations, May 2014.

The status of the work of the DEMON group is completed.

3.5.5 Standards, Best Practices and Guidelines

ERNCIP has started efforts to put together an inventory of standards, best practices and guidelines [13]. ERNCIP has invited members to provide information to compile this inventory. Currently there are three entries related to explosives detection, all referring to ECAC (see paragraph 3.3) and five entries related to resistance of structures to explosives, all related to EN and ISO standards for blast and explosion resistant glass and windows.

3.6 DG HOME initiatives

DG HOME has organised a technical working group on detection performance requirements. Goal is to develop and implement voluntary standards for the industry for detection equipment outside of aviation security, more particular to protect public spaces. The group consists of industry, policy makers and regulators as well as research institutes. This has resulted in a performance standard for x-ray equipment [15]. A standard for Walk Through Metal Detectors (WTMD) is in preparation.

3.7 European Defence Standards Reference System (EDSTAR)

The European Defence Agency has on open database on standards [14]. It contains 2306 entries. It is searchable by several cross-sections, one of which is ‘Technical Domain’. It contains references to both civil and military standards (ISO, EN, AOP, STANAG). Table 4 shows the number of entries for technical domains relevant for the security of explosives.

Table 4 Number of entries in relevant domains in the EDA EDSTAR database

Domain	Number of entries
Blast effects	12
Energetic Materials	43

4 EXERTER WORKSHOPS

Within the EXERTER project two online workshops/webinars have been organised dedicated to standardisation in the field of security of explosives. This chapter contains the findings of these workshops/webinars.

4.1 "Is standardization an enabler for exploitation of innovations in security against explosives?"

The theme of the first webinar, organised in October 2021 in conjunction with EXERTER WP5, was: "Is standardization an enabler for exploitation of innovations in security against explosives?". The 3½ hour webinar consisted of 4 blocks:

Block 1: Setting the scene: 10-minute overview presentations outlining different aspects and viewpoints;

Block 2: Special Topics: 8-minute pitch presentations addressing selected and more detailed aspects;

Block 3: Break-out sessions: moderated by EXERTER professionals, this entails dedicated discussions on key issues with webinar participants;

Block 4: Harvesting the webinar results.

The aim of the webinar was to invoke discussion and connect attendees (a variety of explosive security professionals: law enforcement, policy makers, scientists, equipment manufacturers, R&D institutes and other stakeholders) during the break-out sessions by highlighting important and different aspects addressed in the previous blocks.

4.1.1 Audience

The webinar was attended by 67 security professionals, including EXERTER project partner representatives. A wide variety of sectors was represented, as shown in Figure 14.

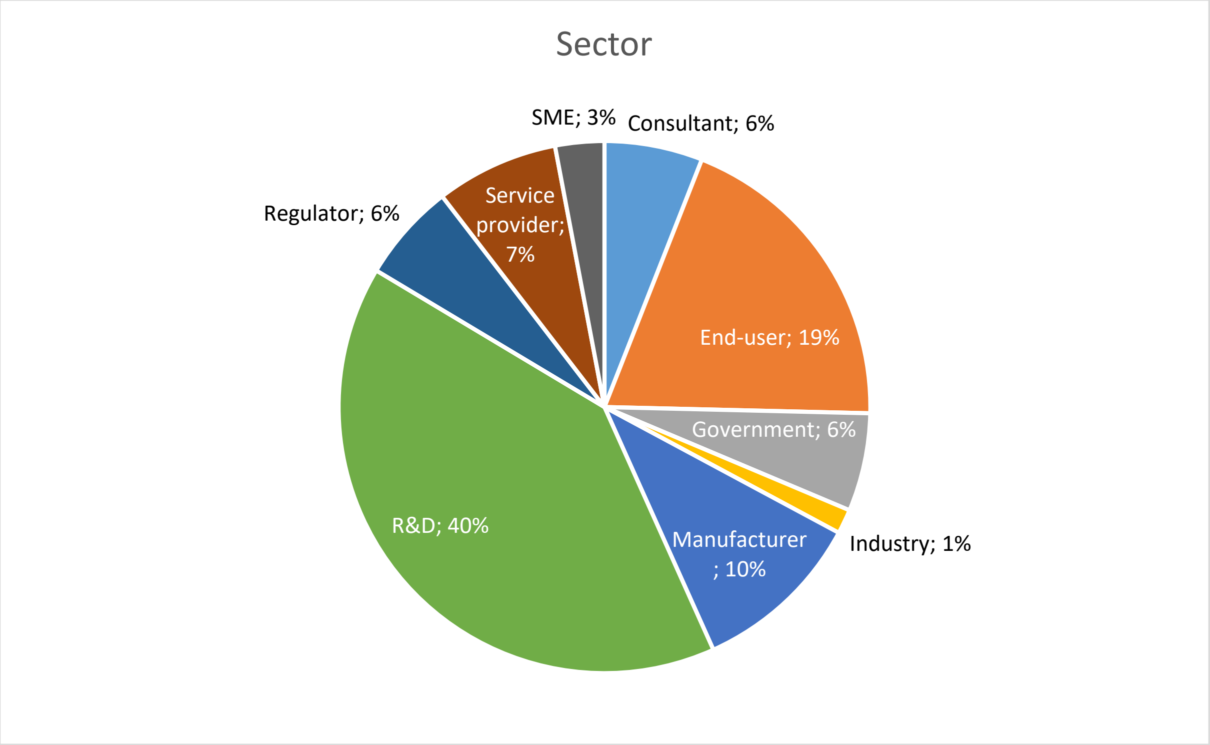

Figure 14 Audience categorised by sector

Thirteen countries were represented by the audience, based on the origin of the organisations. Also international organisations (e.g. the European Commission) were represented. The categorisation of countries is shown in Figure 15.The international organisations are in the category "International".

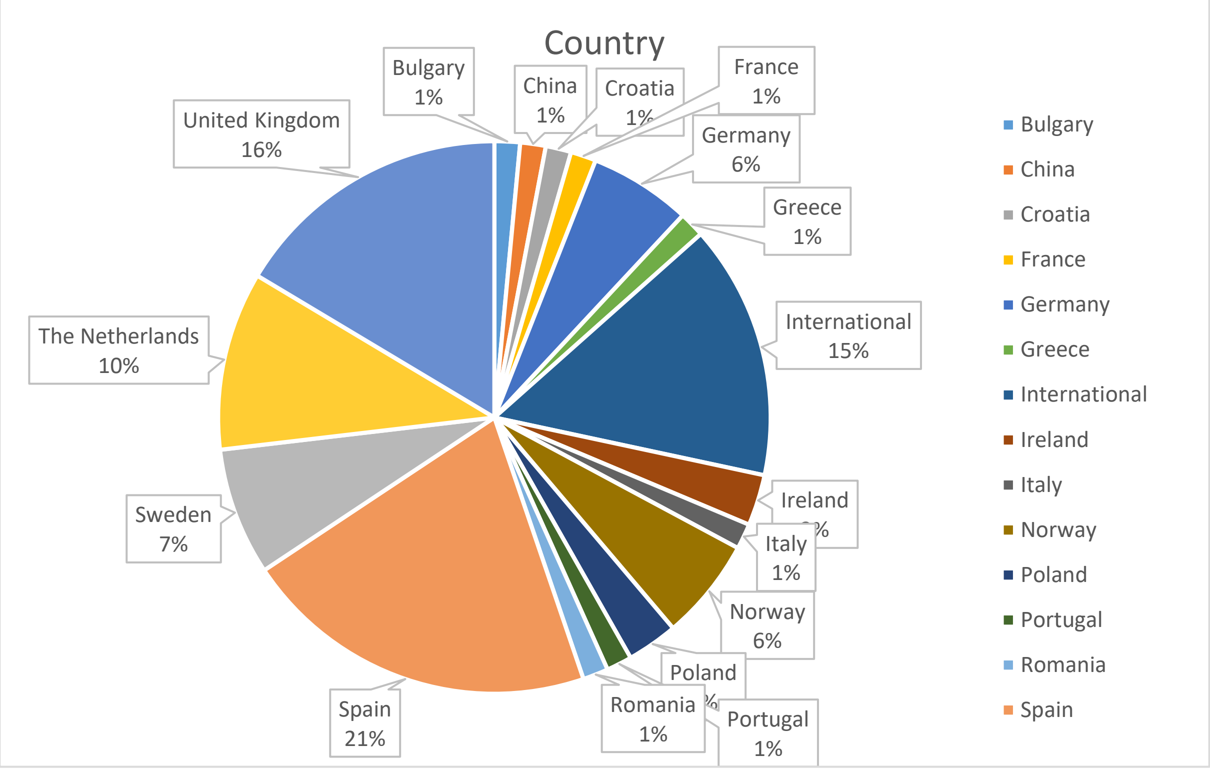

Figure 15 Audience by organisation country

4.1.2 Presentations

<u>'Setting the Scene'</u>

The first presentation was given by Dr. Koolloos from TNO, on the European FP7 research project HECTOS**,** that investigated the harmonisation of evaluation, certification and testing of physical security products, is therefore very relevant for WP4. The HECTOS project focused on the evaluation and certification schemes for physical security products. More information on HECTOS, relevant to EXERTER can be found in chapter 3 and in the relevant appendices.

The second presentation was of a UK speaker with the title "Standardisation – A UK Critical Infrastructure and Crowded Places Perspective. Is the great the enemy of the good?" and described the complex landscape in the UK concerning standardisation. Main take-aways are that (performance) standards may work counterproductive, hampering innovation when the requirements are set to high to achieve. Sometimes it is better just to mitigate risks, which is the UK approach. Nevertheless, standards are important, and this includes guidance and best practices. In the UK there are examples for mail screening and people screening. Test methods for emerging technologies should be in place, when not developed. The last message to audience was not to copy the standardisation approach for aviation security equipment (see paragraph 3.3), when not appropriate, since it may be an overkill.

The third presentation from Mr. Kearney was on the 'standardisation of use'. According to Mr. Kearny, of the Irish armed forces, standardisation in aviation security sets the bar, but is very complex. Again, like the UK speaker before him, standards must be achievable. Mr. Kearny also addressed the problem of 'language', meaning terminology. Illustrated by examples from (military) search, he made a case to standardize 'language'. In the field Standard Operating Procedures (SOPs) are important. NATO has implemented some very effective examples.

’Special Topics’

Mr. Sander Olivier from the Dutch National Coordinator for Terrorism and security (NCTV) introduced ‘Standardisation and testing of explosive detection equipment for Aviation Security’. He described the process (see also paragraph 3.3 on the same topic) and outlined the pros and cons of standardised testing for several stakeholders:

Pros:		
	Manufacturers:	access to a single European market
	Regulators:	no double testing efforts, European baseline
	Airports:	publicly available list with certified equipment
Cons:		
	Manufacturers:	only one way to enter market
	Regulators:	less flexibility to add threats
	Airports:	hampers speediness of innovation

The title of the presentation from Mr. Mann from EOS – the European Organisation for Security was “Crossing the Valley of Death: Standardisation – blessing or curse?”, referring to the technology development after the concept has been proven and before industrialisation and implementation. The main conclusions were:

- Requirements are needed and are very helpful to designers, customers and investors
- Therefore, standards do help, but compliance costs need to be considered
- There is a transition as we move up TRLs[3]:
    - At lowest TRLs requirements and standards may inhibit innovation
    - At mid TRL requirements are needed more than standards
    - At high TRL standards are needed – though they need to be thought through to make sure they do more harm than good

Mr. Dodds. From ICTS UK and Ireland talked about Standardisation for Explosives Detection Dogs. Standards are a must for teams to work together, but must be agile and changeable.

Dr. Falder from DSTL (UK) talked about how (explosive) simulants can help to reduce the testing burden. One of the key take-aways was that, in order to ensure simulants are fit for purpose it is important to have standards for the properties and validation of simulants. This allows different labs/test centres to ensure testing is comparable, and it allows industry to ensure equipment is developed for the right materials. However, it requires data to be collected on real materials and standards to be set for how to do this.

The last presentation was from Mr. van der As, from Aalbers-Wico, titled: “Building security - standards versus reality”. It handled about the (sometimes) contradictory requirements in standards for physical protection (blast resistant structures) concerning security and safety.

4.1.3 Online poll

During the break an online poll was held with five high level questions concerning standardisation and security of explosives.:

1. Is standardization an essential condition for exploitation of innovations in the area of security of explosives?
2. Should standardization focus on system security performance or component security performance?

[3] TRL: Technology Readiness Level; see for instance https://en.wikipedia.org/wiki/Technology_readiness_level

3. Should standards for products for detection of and protection against explosives be formulated and imposed on national, European or world level?
4. In the security area: what works best: voluntary of mandated standards?
5. What works best for standardization in the security (explosives) area: bottom up or top down approaches?

The results are shown in Figure 16 to Figure 20.

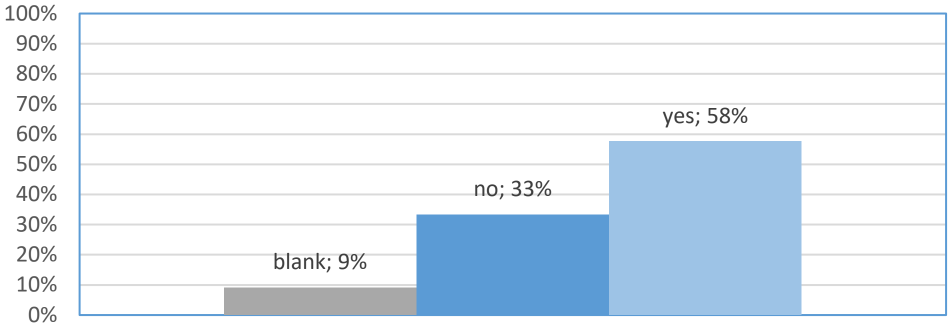

Figure 16 Poll Question 1: Is standardization an essential condition for exploitation of innovations in the area of security of explosives? (n=33)

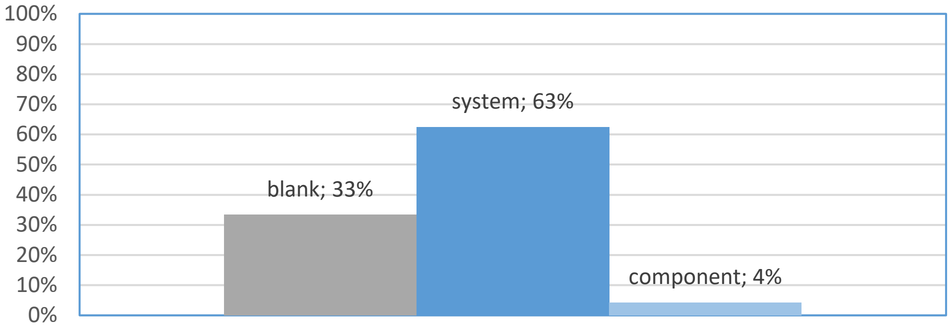

Figure 17 Poll Question 2: Should standardization focus on system security performance or component security performance? (n=24)

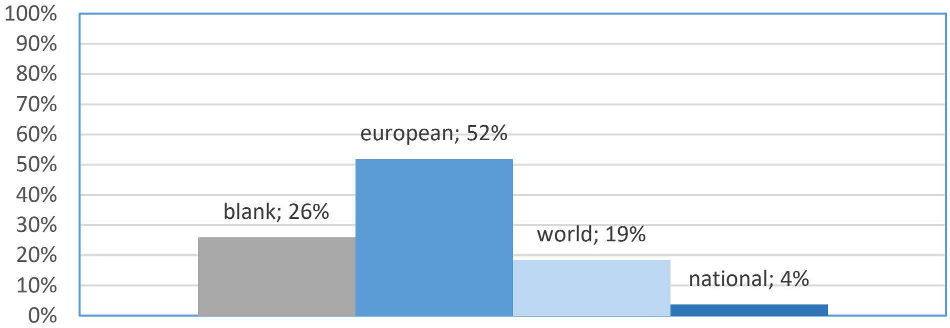

Figure 18 Poll Question 3: Should standards for products for detection of and protection against explosives be formulated and imposed on national, European or world level? (n=27)

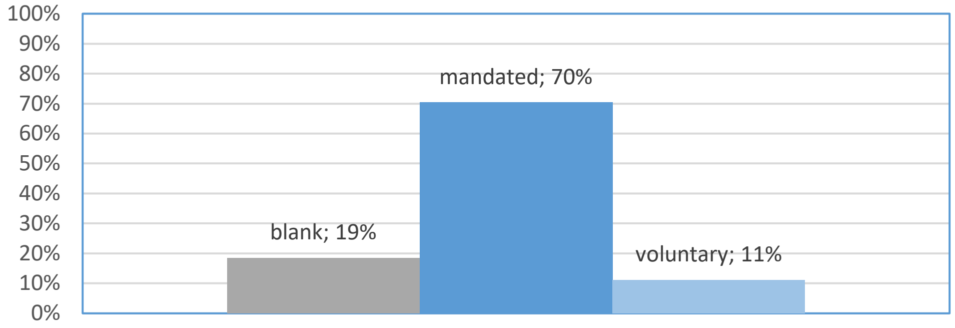

Figure 19 Poll Question 4: In the security area: what works best: voluntary of mandated standards? (n=27)

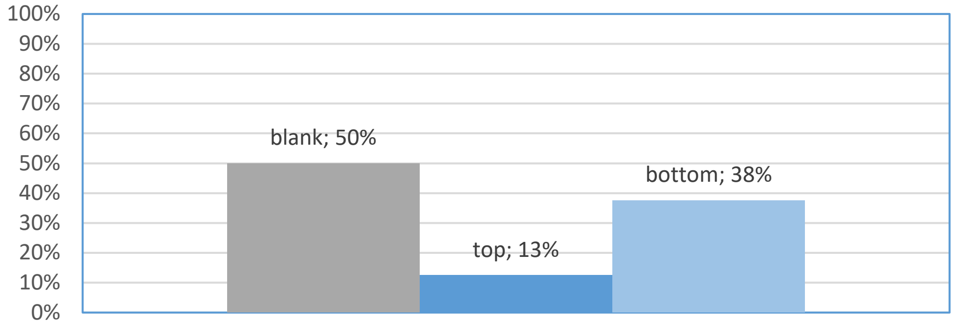

Figure 20 Poll Question 5: What works best for standardization in the security (explosives) area: bottom up or top down approaches? (n=24)

Given the relatively small number of answers, a further breakdown to sector or country would not yield statistical valid information. However, based on this small, non-representative poll, the majority of the security community thinks that standardisation is important for innovation. Standardisation should be mandated on a European level, based on system level performance, but implementation should be done ‘bottom-up’, i.e. with strong involvement of the users.

4.1.4 Break-out sessions

The break-out sessions, in which open discussions on the subject “Is standardization an enabler for exploitation of innovations in security against explosives?” were encouraged, were separated into 3 groups, to provide different perspectives on the subject:

1. Mainly manufacturers and end-users
2. Mainly academia and R&D institutes
3. Mainly policy makers and regulators

All discussion groups were moderated by EXERTER partner professionals. The main conclusions of the groups are summarised in Table 5.

Table 5 Summary of conclusions of the breakout sessions

Manufactures and end-users
Standards must be adapted to the application. Take into account different deployment scenarios. Standards should be mindful of manufactures needs. Involve all parties during the construction of the standard. Standards must be focused on making customized products.
Academia and R&D
Aspects for which standardization is important: - Opening to market for higher TRL - Understand the threat for new entities in the explosives security market - Ethical and legal aspects (generic) R&D should work both ***with*** and ***on*** standards: use expertise to create, if not use to gain expertise Low TRL research standards are needed, but different from ‘normal’ standards, less detail, flexible: not obstructive, but a ’point on the horizon’
Policymakers and regulators
Standardisation is important if used appropriately. Start voluntary and let the governments decide to make it mandatory, depending on the domain Complexity: a clear statement about the goal & scope: what is what the standard wants to standardize and why Regulators/legislators tend to be conservative, challenging innovation as they prefer to operate within the confines of existing technology. This may stifle agility in innovation during an evolving/novel threat Security has specific features and requirements with respect to threats, which change continuously

4.2 “Processes and Technology supporting the Security of Explosives”

The theme of the second webinar, organised in December 2022 in conjunction with EXERTER WP5, was: “Processes and Technology supporting the Security of Explosives”. The 3 hour webinar consisted of 3 presentations with intermediate discussions:

Presentation 1:	“Standardisation in information sharing”
Presentation 2:	“Is current technology enough to afford new threats?”
Presentation 3:	“High Resolution Radar System Embedded on UAVs for detection of buried IEDs”

4.2.1 Audience

The webinar was attended by 84 security professionals, including EXERTER project partner representatives. A wide variety of sectors was represented, as shown in Figure 21.

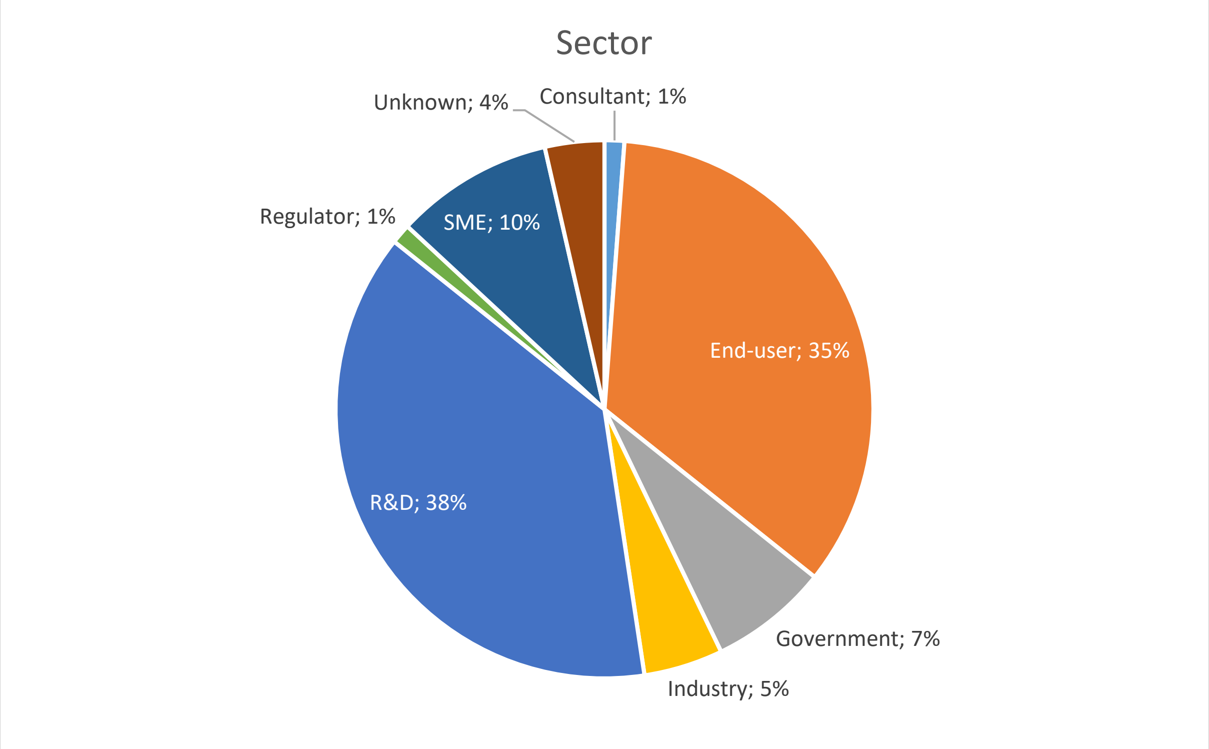

Figure 21 Audience categorised by sector

Fifteen countries were represented by the audience, based on the origin of the organisations. Also international organisations (e.g. the European Commission) were represented. The categorisation of countries is shown in Figure 22 The international organisations are in the category “International”.

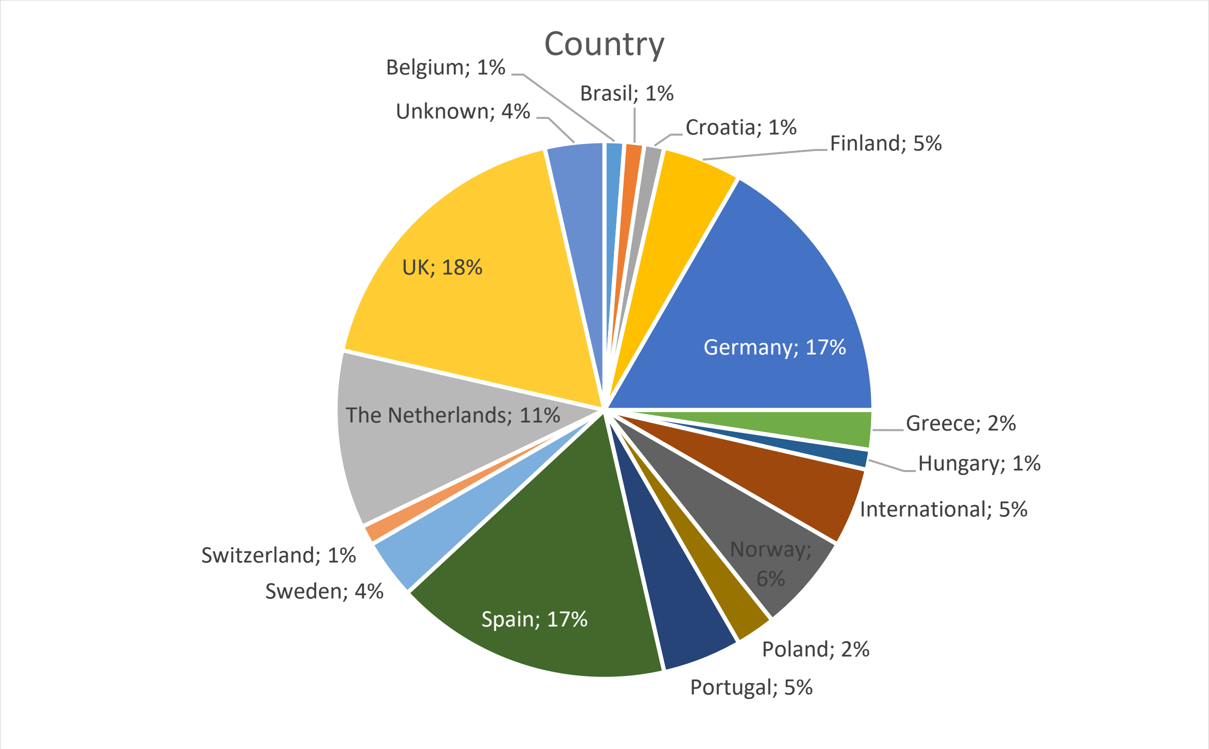

Figure 22 Audience by organisation country

4.2.2 Presentations

Mr. Schouten from Dyami gave a presentation on sharing intelligence within the Dutch aviation sector, with the MH17 case as an example. The most important take away is that trust is important in sharing sensitive information. Building a network, knowing people ('drink a lot of coffee') is essential. However the importance of agreements on information sharing between relevant parties should not be underestimated. Clarity of the exchanged information avoids misunderstandings and false assumptions.

Official exchange platforms for sensitive information work, but do not always have the necessary pace of information exchange. In the opinion of Mr. Schouten, technology cannot help to gain trust. In person exchange of information remain necessary.

Governments should also exchange sensitive information with other parties, like industry and R&D institutes, on a need-to-know basis, to induce innovation, or to have a coordinated and coherent reaction to mitigate a threat.

Mr. Zamora from Mion Technologies presented on the obstacles that SMEs run into when developing explosives detection systems. Technology is often ahead of regulations. The certification process is slow and expensive. There is a lack of standardisation between sectors and applications. Requirements are complex and associated testing is complex and expensive. Specifically for air cargo screening the main obstacles that were encountered by Mion Technologies were the lack of testing opportunities to test with real explosive samples, and the lack of a regulatory framework. This resulted in financial problems, even though the technology was at TRL 7.

According to Mr. Zamora, several options are possible to remove these obstacles:

1. Better access for SMEs to public funding, like Horizon Europe and national funding, and private funding;
2. Find new applications, other than the original ones;
3. Actively engage policy makers;
4. Better access to explosive threats, based on agreements with authorities and closer collaboration with research institutes;
5. Accelerate innovation by closer collaboration with universities;
6. Faster development of standards and regulation.

Mrs. Garcia Fernandez from Oviedo University had a presentation with the title "High Resolution Radar System Embedded on UAVs for detection of buried IEDs". It described the development up to TRL 6/7. Currently collaboration with the industry is sought to develop the system further into a commercial product.

5 Identified opportunities for standardization and certification in the field of security of explosives

Based on the inventory of initiatives in chapter 3 and the outcome of the workshops described in chapter 4, this chapter presents first the main observations. Subsequently, opportunities for standardization are identified.

5.1 Observations

4. As early as 2007, the need for standardisation in the field of security of explosives was identified. See for instance objectives 3.2.1, 3.4.1, 3.4.2, 3.4.3 and 3.4.4 in [6]:
    - "Develop minimum detection standards based on relevant scenarios and threat assessment. These standards should be updated as technology evolves"
    - "Create a European wide certification scheme for explosives detection solutions"
    - "Create a European wide testing scheme for explosives detection solutions. Under the scheme relevant authorities and institutes would be able to exchange test results"
    - "Create a European wide trialling scheme for explosives detection solutions. Such a system should be supported by an EU programme and should allow for conducting performance trials under realistic conditions in same or similar scenarios"
    - "Assess the need for the development of standardized procedures and processes concerning certification, testing and trialling processes"
5. These objectives are followed up by the NDE in their CTT report (paragraph 3.1), in which a clear scheme was presented for certification, testing and trialling. Also the ERCIP initiatives resulted from the action plan in 2007.
6. Later on the HECTOS project was executed, following a call in the EU FP7 program. Where the previously mentioned initiatives focussed mainly on the detection of explosives, this project provided a comprehensive scheme to come to certification of a much wider variety of security products.
7. Even though some results from for instance ERNCIP found their way into EN or ISO standards, much work in their Technical Committees seems to be executed isolated from other initiatives.
8. The field of aviation security is a special field with respect to standardisation end certification. It is one of the most mature fields, but is also perceived as complex, slow and expensive. Nevertheless it may serve as an example of successful implementation of standardisation.
9. The speed of developing standards is a of concern. With the DG Home initiative (section 3.6) as a clear example, where it took several years to come to a standard for x-ray equipment image quality, of how slow such a process can be.
10. The approach of developing standards seems to be fragmented, with many initiatives, some of them repeating previous work. Coordination on a European level seems missing.
11. Most initiatives on a European or trans-national level are in the domains of explosives detection and blast resistant structures, mainly glass and windows. Other fields are less represented, but the assumption is than in the fields of prevent and react, standardisation takes place more on a national level.
12. From the workshops and other discussions within EXERTER a clear need for better (classified) information exchange is desired. This means exchange of intelligence and information between member states, but also between agencies and even within organisation. Exchange of classified information with industry, including SMEs, R&D and universities is perceived difficult, or even impossible, hindering innovation.

5.2 Opportunities and recommendations

Based on the observations in the previous paragraph, the following opportunities and recommendations for standardization and certification in the field of security of explosives, are identified:

1. Use the existing information and schemes developed in previous projects. Especially the HECTOS proposed schemes can be used almost directly to develop and implement standards, but also the NDE scheme, which also involves trialling of new technologies, can enhance innovation.
2. Coordinate the development of standards and certification on a European level. Make sure that it leads to a coherent set of standards, throughout the prevent, detect, mitigate and react domains.
3. The performance standards should reflect on one hand the ambition, derived from the level of inferred security provided by a technology (or method), and on the other the current and near future realizable technical performance. The resulting performance standards (current and future tiers) are, therefore, attractive to industry and SMEs because they represent a realistic market outlook, and the streamline competition on performance.
4. Pay special attention to the exchange of classified information with innovators and enable strong interaction between innovators, end-users and policy makers. This ensures that products will better meet expectations of end-users and requirements from potential regulators.

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7 Abbreviations and Definitions

ASTM	American Society for Testing and Materials
CEN	Comité Européen de Normalisation (European Committee for Standardization)
DIN	Deutsches Institut für Normung (German Institute for Standardization)
E&C	Evaluation and Certification
E&W	Exploisves nad Weapons
ECAC	European Civil Aviation Conference
EOS	European Organisation for Security
ERNCIP	European Reference Network for Critical Infrastructure Protection
EU	European Union
ISO	International Organization for Standardization
LEA	Law Enforcement Agency
MS	Member States
NATO	North Atlantic Treaty Organisation
NDE	Network on Detection of Explosives
NEN	Nederlandse Norm (Dutch Standard)
NIST	National Institute of Standards and Technology
R&D	Research and Development
SoE	Security of Explosives
SOP	Standard Operating Procedure
WP	Work Package

Annex A HECTOS schemes for Explosives and Weapons Detection Equipment

A.1 Identify the scope of the scheme

A.1.1 Product type(s):

Current Status:
The ECAC CEP for aviation security comprises liquid explosives detection systems (LEDS), explosives detection systems for hold baggage (EDS) and cabin baggage (EDS-CB), explosives trace detection (ETD), security scanners (SSc) and metal detectors (MDE). A study group is working on a TM for explosives vapour detectors (EVD) and walk through metal detectors (WTMD).

Potential Implementation:
The proposed Certification system for E&W detection equipment will cover a wide range of technologies:

- Material-specific explosives detectors
  - Bulk explosives detector (X-Ray, NQR, Neutrons, etc) for mail, bags, cargo, etc.
  - Particle explosives trace detectors
    - Contact collection based detectors (Swab-based)
    - Non-contact collection based detectors (collect particles by dislodging)
    - In situ surface trace detectors (LIBS, Raman, IR, etc.)
  - Vapour explosives trace detection
    - Sampling based detector
    - In situ detectors
  - Visible quantity explosives detection
    - Collection-based detectors (test kits, etc.)
    - In situ detectors (LIBS, Raman, IR, etc.)
- Anomaly detection / Shape detectors (People Screening Portals, Weapons, Metal detectors)

A.1.2 Application:

Current Status:
The largest current application area of E&W detection systems is aviation security.

Potential Implementation:
This selection is based on the scenarios from D1.2 and covers all products in the E&W detection category.

- Scenario 4 - Security Screening – large public event (permanent venue)
- Scenario 5 - Security Screening – large event (temporary venue)
- Scenario 6 - Security screening & surveillance – open crowded place
- Scenario 8 - First responder application – suspected CBRNE incident
- Scenario 10 - School/Hospital – low security, open building – protection from attack

- Scenario 11 - Perimeter security – critical infrastructure (open site)
- Scenario 12 - Perimeter security & access control - government or critical infrastructure building (urban)
- Scenario 16 - Cargo/ Large volume freight screening

All scenarios are focussed on the prevention of an attack by explosives and weapons, except for Scenario 8 which is also focussed on the safety and forensic aspects after an incident, which is not further considered in this case study.

A.1.3 Identify purpose of scheme:

Current Status:
The higher purpose of a scheme for E&W detection products is providing protection for the public. More concrete, the scheme serves to assure users of the product that the products comply with security performance requirements.

Potential Implementation:
The purpose of the non-Aviation security scheme must be discussed during this scoping phase. It must be clear whether it will be developed to meet performance requirements, or to provide certified performance information to end-users.

A.2 Identify scheme fundamentals

A.2.1 Establish a preliminary working group:

Current Status:
The ECAC established ”study groups” for all product types covered under the CEP which are the technical experts meeting periodically to establish and maintain the testing process. The ”management group” is responsible for establishing and maintaining the ”Common Evaluation Process” (CEP)

Potential Implementation:
For non-Aviation security, the Working group should mirror the existing ECAC study groups and consist of experts in the field:

- Weapon and explosives experts: People from the police or army with knowledge of and experience with firearms and explosives
- Intelligence services (governmental). To define threats, trends and general risk assessment
- Application experts/security managers: People involved in organisation and security of (large) events. In order to identify operational requirements, possibilities, constraints, general risk assessment
- Test experts: Test house personnel with wide experience on detection devices (portals), (certification) testing in the field of W&E detection and safety requirements with respect to handling of dangerous items. The experience on detection devices is needed to understand the workings and capabilities of detection devices and maintain independency with regard to manufactures

Many of the members of the proposed working group can probably bring in their experience from the work in the ECAC CEP.
The working group should be established and chaired by the system owner to grant for consistent procedures over the whole system.

A.2.2 Identify stakeholder groups:

Current Status:
The stakeholders for Aviation security applications are known and represented in the ECAC-CEP scheme.

Potential Implementation:
Stakeholders/users of the scheme (non-Aviation security):

- Scheme owner / operator: The scheme owner is the organisation responsible for developing, maintaining and operating a specific certification scheme. The organisation consists of representatives from certification and evaluation bodies (test houses)
- End-Users (e.g. organizer of an event or owner of a venue that requires protection). This stakeholder is interested in two reasons:
  1. for applications where no regulation exists with respect to security they want to show the public that the venue is secure.
  2. for applications where the organizer is obliged to provide a certain level of security and has to meet the performance requirements that are in force
- Test houses: The test houses must be capable of carrying out the evaluation tests. This means that they need to have: licenses, test facilities, threat items, expertise, security clearance
- Public: The public needs to be convinced that the detection devices enhance public security, that they are safe, and that personal privacy is respected and guaranteed
- Manufacturer: The manufacturers provide the devices that are certified. They must know (to a certain level) which performance is required and have a global idea how their devices are evaluated
- Regulator: For applications where the organizer is obliged to provide a certain level of security the regulator is involved in the definition of performance requirements and the surveillance.

A.2.3 Perform an initial survey of existing standards and requirements landscape:

Current Status:
Av-Sec: Requirements are described in EU regulation. These regulations dictate that E&W detection equipment has to be used at airport checkpoints and that the equipment has to meet certain (confidential) performance requirements.
Apart from a WTMD performance standard (including TM's) by the US National Institute of Justice (NIJ 0601.03) there are currently no performance standards for people screening portals for non-Aviation security applications.
For ETD two American Standards exist (ASTM 2677-14 and 2520-15), giving detailed test methods but not defining any performance requirements.
The ERNCIP thematic group Detection of Explosives Materials for Operational Needs (DEMON) has reported ongoing legislation concerning (non-Aviation) Explosives Detection Equipment. Their deliverable "State of the Art Report on European Legislation relating to Explosives and Explosive Detection System for non-aviation configurations" confirms that there is legislation concerning Explosives outside Aviation security, but not with respect to security performance of detection systems.

Potential Implementation:
-

A.2.4 Identify a financial model:

Current Status:

The manufacturers pay currently for testing and evaluation of E&W detection equipment for Aviation security applications. Outside Aviation security, no legally binding requirements exist. This allows end-users to choose between equipment with lower performance at lower prices and best performance at higher prices.

Potential Implementation:

Testing and certification of E&W equipment is complex and expensive (currently for Aviation security application varying from 10.000 € for simple LEDS tests up to 150.000 € for EDS-CB test with liquid detection capability).

Certification therefore drives up the prices for equipment, which finally has to be paid by the end-users. The market size for E&W detection equipment outside Aviation security is small at least for explosives detection. Regulating the use of E&W detection for critical infrastructure protection could enlarge the market and promote the need of a certification system for this market. This would however be a major societal change. If regulation just set minimum standards for equipment without enforcing its use, it would raise prices and could reduce the level of security because users might decide to do nothing rather than buy expensive equipment.

The financial model depends hence on whether future requirements will be binding or voluntary:

- Binding requirements to use certified equipment will force manufacturers to undergo certification of their systems. Certification will raise the trust of the end-users but will also raise the costs. These costs have to be taken in advance by the manufacturers but at least the authorities responsible for the use of the certified equipment have to account for them.
- Furthermore binding requirements are an obstacle for new technologies as there is no market for non-certified products. Innovative products which fulfil the actual requirements only partly but have a better detection performance for new evolved threats would get no permission for use and therefore cannot enter the market.
- Voluntarily certification will only be done if it provides an added value for manufacturers to undergo the certification process. As long as end-users trust on ECAC-approved systems even for application outside Aviation security the inclination of manufacturers to pay for additional certification will probably be low and depend on the market size of the application.
- On the other hand voluntarily certification leaves the possibility to sell and use uncertified equipment that can hence be vended at lower prices.
- A proper performance measurement scheme based on a relatively simple evaluation test without covering all details for defined applications could be a practicable way to promote certification on voluntary basis.

A.3 Identify system structure

A.3.1 Establish authority/mandate:

Current Status:

Aviation security requirements for Explosion Detection equipment are established in EC regulation EC 300/2008 on common rules in the field of civil aviation security and the accompanying EC 2015/1998 laying down detailed measures for the implementation of the common basic standards on aviation security. The regulation is a binding legislative act and must be applied in its entirety across the EU.

Potential Implementation:

Considering the purpose of the certification system for E&W detection equipment, the performance requirements may be binding and defined on European level (i.e. EU regulation), like for Aviation security applications. However, outside Aviation security a large variety of applications, stakeholders and requirements exists, which complicates the process to capture all requirements in EU-regulation. Furthermore legal regulation will be based on state of the art technology and support technologies that fulfil the requirements that were in place when the legislation was made. This

might thus be an obstacle for newer technologies which are suitable for emerging threats but do not fulfil the former requirements.
Voluntary requirements (e.g. established in European standards) will probably only be followed for certification if the corresponding costs are low, or the demand from the users for certified products is high, see also step 3.4.

5. Irrespective whether the requirements are regulated or voluntary, national security authorities should be able to implement additional (more stringent) performance requirements based on national security needs.

A.3.2 Identify existing systems:

Current Status:
A harmonized certification system for E&W detection should be derived from the existing and broadly accepted ECAC-CEP certification system for Aviation security and which should be brought in line with the ISO/IEC17000 standard. Aspects that can be adopted from ECAC-CEP:

- Centralized procedure for equipment certification requests by manufacturers
- Independent evaluation through rotating allocation of tests by EB's
- Scientific base of the test method
- Way of handling of confidential information (test requirements, methods and results)
- Quality assurance by
  - endorsement procedure with multiple Certification Bodies (CB's) involved
  - interlab visits
  - exchange of experience during study group meetings

6. Potential Implementation:

For Aviation security, the following aspects should be added or improved to the ECAC-CEP certification system:

- Issuing of one certification mark or identifier
- Proficiency testing
- Well defined threat set (use of explosive simulants) where only a long-list can be disclosed to manufacturers to avoid systems that are just tailored to fulfil the requirements, which cannot react to evolving threats.
- Surveillance functions if required

A.3.3 Identify system owner and management:

Current Status:
The current owner of the Aviation security certification system is ECAC-CEP in which the national authorities of all ECAC MSs are involved.

7. Potential Implementation:

For non-Aviation security, the system owner should be a centralized EU authority with representatives from all EU MS national (governmental) authorities because of the confidential nature and the societal relevance of security.
The system management functions, rules and procedures should be established by the management group. They must be legally sound and accepted by the participating members.

A.3.4 Identify security specific management:

Current Status:
Aviation security: ECAC-CEP applies rules and procedures for handling of confidential information (test requirements, methods and results). These include restricted Common Testing Methodology

(CTM) and appendices describing performance requirements and threats (confidential in case of solid explosives or secret in case of liquid explosives).

8. Potential Implementation:
9. Rules for handling of classified requirements, test methods and data will also be necessary outside Aviation security and need to be established by the system owner.

A.4 Identify standards

A.4.1 Identify relevant product and measurement standards:

Current Status:
There are no detection performance standards for E&W detection equipment for applications outside Aviation security.
See step 3.3

10. Potential Implementation:
11. -

A.4.2 Identify harmonised and local standards:

Current Status:
More stringent measures are required by some MSs in Aviation security.
There are no detection performance standards for E&W for applications outside aviation security.

12. Potential Implementation:

Harmonised testing across Europe is only possible on a common basic requirements set. National authorities will not relinquish on the possibility to set up country specific requirements (MSM).

A.4.3 Identify need to develop new standards:

Current Status:
-

13. Potential Implementation:
14. Performance standards for E&W for applications outside aviation security have to be developed for each product type and each single application and should be defined, preferably with multiple performance grades. Complying with these new standards does not have to be binding, for example when providing a standard for the use of this equipment, e.g. for large events. The security needs for a certain application may be forced by national or local authorities and the applied security equipment shall accordingly follow the standard.
15. If a Performance Measurement scheme is developed (see step 5.1) no performance standards are required.

A.4.4 Review stakeholders acceptance of identified standards:

Current Status:
Aviation security requirements are regulatory at European level and de facto “accepted”
Outside Aviation security compliance with US NIJ standards for WTMD equipment is widely accepted as a quality mark.
The ASTM-Standards for ETD are not widely used in Europe.

16. Potential Implementation:

17. Manufacturers fear over-regulation that may become an administrative and financial burden. Also, harmonised standards and certification tighten the state of the art and hinder flexibility to react on changing threats. Acceptance will depend on the number of standards: while manufacturers prefer as few standards as possible to keep the evaluation costs low, end-users would prefer as many tailor-made standards as possible to find the most suitable systems for each application.

A.5 Identify detailed requirements

A.5.1 Establish performance scope:

Current Status:
The Aviation security certification scheme, as managed by ECAC-CEP, is a performance threshold scheme, i.e. the comparison of the detection performance against requirements.

18. Potential Implementation:

For non-Aviation security a performance measurement scheme for application based certification seems the most promising way forward since the various application areas lead to various requirements regarding threats and amounts which are not likely to be defined to that extent. However, if a (partial) performance threshold scheme is implemented for (certain) non-Aviation security applications, e.g. because of a mandate by the EC, this step will be even more challenging. In both cases, quite some work has to be done in identifying requirements (either threshold performance or performance measurement requirements) and this is considered as one of the most complex steps in the scheme implementation process.

A.5.2 Identify functional & non-functional security requirements:

Current Status:
The key characteristic to be evaluated is the Detection Rate, i.e. the machine’s capability to automatically detect concealed weapons and/or explosives on the body or in the baggage of a person. The False Alarm rate is optional, depending on the operational requirements. Current Aviation security performance requirements are given in EC 2015/1998 laying down detailed measures for the implementation of the common basic standards on aviation security.

19. Potential Implementation:

Same as current. False alarm rates should be measured alongside detection rates. RoC curves may be measured for products where sensitivity can be varied. Moreover, multiple performance grades are possible but the way to implement them in a certification scheme depends on the product type.

20. Requirements should allow for updates for new / evolving threats.

A.5.3 Identify performance/threshold measurement requirements:

Current Status:
Current Aviation security performance requirements with respect to the detection rate are given in EC 2015/1998 laying down detailed measures for the implementation of the common basic standards on aviation security.

21. Potential Implementation:

The performance requirements can be expressed in:

- Detection rate for several weapons and explosives categories (types, sizes, quantity and level of concealment)

- False alarm rates with or without benign articles

For performance threshold schemes the threshold of the detection rate can be given in several grades (e.g. standard 1, 2 and 3, where 3 is the highest threshold), which allows for application based certification. The threshold for the false alarm rate can be given in several minimum grades (e.g. standard 1, 2 and 3, where 3 is the highest threshold, i.e. the lowest false alarm rate.).

A.5.4 Identify different and conflicting requirements:

Current Status:
In Aviation security, the definition of threats is done by national security boards of police and intelligence based on risk analysis and may therefore lead to differences in national requirements. These are called More Stringent Measures, which are requirements at national level in addition to the ones stated in the EU regulation, although usually the requirements identified in EU regulations are sufficient.

22. Potential Implementation:

23. Outside Aviation security, the requirements for E&W detection products will specify the threat materials and should be determined by the scheme owners. Every member state can have its own priorities with respect to threat items and other requirements based on a national risk analysis. The detection performance evaluation can therefore vary between member states in terms of threat items. Even more important is that requirements vary broadly between different applications.

A.5.5 Identify steps for achieving common view in case of conflicting requirements:

Current Status:
-

24. Potential Implementation:

25. When requirements are defined as European regulation they should be defined as a long list, i.e. including all possible threats to be detected (possibly categorized in threat groups). The TM as developed within the certification scheme can then be an “exam” with a short list of threats to be agreed by all member states. Each member state can introduce more stringent requirements (at national level) with respect to the threat items and sizes to be detected. This is a more convenient solution than adding threat items to the base-line short list which has a huge impact on already certified products. Threat items may be added temporarily to the threat list Europe-wide because of some emerging threat situation, which itself may not justify to change the TM and list of certified products. However, this does not lead to harmonised schemes, except as a common baseline. Manufacturers will still need to test and certify in each country with MSM, with all its financial consequences.

A.5.6 Identify the security sensitivity of information:

Current Status:
For Aviation security, performance requirements, threat items and threat sizes against which detection equipment is certified within the European Union are classified and hence not publicly available.
The long list and the required amounts are only available for stakeholders with the respective security clearance, while the actual test list and moreover the national more stringent measures are not disclosed to manufacturers to avoid systems which are tailored to the actual test.

26. Potential Implementation:

The certification schemes should acknowledge the classified nature of requirements related to explosives and weapons detection. Scheme owners, scheme operators and evaluation bodies need to have access to these requirements to enable conformity assessment.

The classification level of evaluation results depends on the level of technical content. Reports with details on detection rates and threat items are classified. The classification may be lower outside of aviation where there is not the same concern about revealing critical threat sizes. A basic report of evaluation results (compliance with a standard) should be published without classification.

A.5.7 Review acceptance of requirements:

Current Status:

Classified requirements are not easily accepted by manufacturers because it conflicts with product development.

27. Potential Implementation:
28. In order to facilitate acceptance, it is recommended to include as much as possible stakeholders from the beginning of the requirement development process. However, classified requirements do not allow all stakeholders to be involved. In that case the process should be explained well and the work should be done with transparency. Be that as it may, the limited availability of requirements may negatively affect the harmonization and/or recognition of the scheme.

A.6 Identify test methods

A.6.1 Survey and identify existing test methods:

Current Status:

ECAC TMs exist for LEDS, EDS, EDSC, ETD, SSc and Metal detectors. A study group for vapour detection is working on a TM for EVD. Additionally some national authorities use tailor made additional tests (under MSMs) for national certification of Aviation security-products.

ASTM standards for the evaluation of ETD exist (ASTM E2520-15 and E2677-14) but are not commonly used. (see also D5.2).

American standards for Metal detectors are available from NIJ (Standards 0601.02 and 0601.03) and ASTM (F1468 and C1309). IWPC has developed a Millimetre-Wave Security Sensor Test Protocol (See also D5.3). US and UK developed a common test method for stand-off detection of person-borne threats.

There are no other standardized test methods for LEDS, EDS, EDSC, but the ECAC Test Centres have own test methods for so called “private tests”. These are similar to the ECAC TMs but using different threats and different formulations. They are used to support manufacturers in developing systems.

All these test methods evaluate the detection rate and false alarm rate based on threat types / scenarios and for a certain sensitivity setting.

29. Potential Implementation:
30. -

A.6.2 Adopt existing test methods:

Current Status:

-

31. Potential Implementation:

The ECAC CTMs are confidential and cannot be used without permission of ECAC. However, they would form a good, validated base for non-Aviation security test methods.

- For people screening portals the test method as developed within HECTOS, which is loosely based on the ECAC CTM for SSc, can be adopted and further elaborated.
- For ETD the test method can also be based on the ASTM standards although some improvement on certain aspects is necessary.

A.6.3 Develop new test methods

Current Status:
-

32. Potential Implementation:

For a product category a high level general TM may be defined. For a product type, a process is needed to determine whether the proposed TM (e.g. from another product type) is suitable or should be adjusted (and how).
The TM should be comprehensive and include all possible parameters that may be needed for certification. The TM should include these levels of granularity with sufficient statistical confidence.
The statistical validity should be defined in the certification scheme. The required confidence intervals of the test results (both overall and at higher levels of granularity) should be determined in the scheme and the test method should give instructions on how to calculate the corresponding number of test runs.
Test-induced variance may be larger than the statistical variance especially for TMs where human beings are involved (either as a test person or as a tester with a potentially large influence on test parameters).
The TM must include a dedicated part to enable re-testing based on raw data captured during a previous full test of the same configuration, but a different detection algorithm. Re-use of evaluation results is only possible for explosives and weapons detection products that are capable of recording raw data. A correct registration of all runs during the test is a prerequisite.
Security performance evaluation of W&E detection products in its current form is not suitable for self-testing by the supplier, mainly due to classification and safety issues. Self-testing against existing public standards and a comprehensive test for security performance assessment by an accredited test lab may be a good combination that should be assessed for each product group.
Also, recent developments of deep learning algorithms for weapon detection and the use of simulants (instead of real explosives) open the way to self-testing.

Specific recommendations for the people screening portals TM:

- The following level of granularity should be included in a TM for people screening portals: gender, BMI, threat type / size / location, level of divestment.
- Scoping tests should be used to determine the regions (combination of threat type/size, location and sensitivity of the detector) where the detection system has sensible performance. Testing efforts can then be focused on those regions and wasting time on regions where the performance is virtually zero or virtually perfect can be avoided.
- Alarm zone indication is optional and depends on the envisaged ConOps. It may be taken into account when it is accurate, otherwise the device should be considered a binary detection system (alarm / no alarm).

Specific recommendations for the ETD TM:

- A general TM for ETD can only be defined on a high level by defining the test blocks:
    - Threat detection test

  - False alarm test
  - Suppression test
- For each product type (swab-based particle sampling-, optical-, vapour phase-, etc.) the details of the three test blocks must be specified individually. As a consequence of the complexity to gain valid trace samples, a two stage evaluation has to be considered. In the first stage only valid but artificial samples, which can be prepared with a high accuracy are tested. In a second stage more realistic samples will be tested, which intrinsically cannot be prepared with the same accuracy.
- System specific characteristics, for example false alarm on solvents when testing volatile substances, have to be determined in a scoping test.
- Threat-identification increases the trust in the result, but holds the risk to overestimating the detection capacity of non-identifying systems.

A.6.4 Identify the security sensitivity level for test methods:

Current Status:
The ECAC CTMs for Aviation security are classified and are only provided to the test houses and national authorities.

33. Potential Implementation:

34. Classification levels will be different and may be lower for applications outside of Aviation security.

A.6.5 Identify ethical and legal compliance requirements:

Current Status:
The test laboratories and staff is responsible for executing evaluations to national laws and regulations concerning the general safety and security issues as well as working with ionising radiation. All test laboratories must have the legally necessary permits to handle and store weapons and explosives.
Where test persons are involved (e.g. SSc tests) there are two additional issues to address:

- Since real explosives are attached to the test persons, their participation is strictly voluntary and people cannot be forced to participate.

- Since images and personal information are recorded, all appropriate EC privacy and data collection regulations will be obeyed.

Because of the previous points a clear “Informed Consent Form” must be developed in the mother tongue of the participants and be signed by each participant..

35. Potential Implementation:

Same as for current situation

A.6.6 Review acceptance of test methods:

Current Status:
Test methods developed within the ECAC-CEP system (by a dedicated Study Group) are reviewed and endorsed by a Technical Task Force in which all member states can be represented.
End-users accept the ECAC-CEP TMs, because ECAC “approved” is seen as a quality mark, both for Aviation security and for non-Aviation security applications even though the latter might need quite different requirements that might not be covered by the CTMs

36. Potential Implementation:

37. Review and endorsement of a new test method should be the responsibility of a group of specialists (both on policy level and on technical level) which are independent of the working group that developed the test method. Depending on the classification level industrial stakeholders may be excluded.

A.7 Identify scheme structure

A.7.1 Select ISO/IEC 17067 scheme types 1-5:

Current Status:
ECAC-CEP is conducting type testing only against the relevant EC Regulation. Certification is done at national level. There is no surveillance part. As a whole, this process is therefore similar to a type 1a scheme.

38. Potential Implementation:

39. Aviation security and high security non-Aviation security applications: Given the complex nature of the evaluation, the product and the societal relevance of security, the scheme should concern type certification and include periodic testing of products and manufacturer audits Type 5: ”Scheme including surveillance”. Should a surveillance function not be possible (see step 9) then type 1a is applicable. A type 1a scheme will also be sufficient for most applications outside of Aviation security.

A.7.2 Identify scheme owner and management:

Current Status:
ECAC is the owner of the Aviation security certification schemes. All schemes have the same management rules as the system. Maintenance of the scheme, mainly existing of updating the Test Method, is done by the Study Groups.

40. Potential Implementation:

For non-Aviation security a possible way is to follow the ECAC scheme and that the scheme is managed by a central European authority with representatives from national (governmental) Certification Bodies (CB’s) because of the confidential nature and the societal relevance of security.

41. The system management functions, rules and procedures should be established by the management group, must be legally sound and accepted by the participating members.

A.7.3 Scheme certificate:

Current Status:
ECAC issues so called level 1 reports that includes details on the configuration that was tested, the test house, test date, and the conformity of a product to the EU regulations for Aviation security applications. Certification which permits the product to be deployed in a ECAC member state is done at national level, based on the information provided in that ECAC Level 1 report.

42. Potential Implementation:

The working group should identify what information should be included on a certificate and within certification reports. At least the following information should be included:

- Product category
- Product type
- Application area
- All configuration details (HW, SW, etc)
- Test house

- Manufacturer details
- Test date
- Performance requirement that was met
- Validity of the certificate

A.7.4 Scheme mark information:

Current Status:
-

43. Potential Implementation:

The working group should identify what information should be included on the scheme mark or identifier. At least the following information should be included:

- Security mark / logo
- <System / Scheme name> - certified
- Certificate date

A.7.5 Identify operator(s):

Current Status:
CB: National authorities of the ECAC member states
EB: ECAC Test Centres: Testing facilities with experience, capability and legal qualification to handle W&E, currently TNO (NL), STAC (F), CAST and DSTL (UK), ICT/FPTC (D), INTA (E).

44. Potential Implementation:

CB: to be established as an independent authority centralised on EU level
Given the required expertise and dedicated facilities, the EBs involved in ECAC-CEP are suited to be EBs for non-Aviation security testing and evaluation. In case the test method is (partly) classified, EBs are required to have:

- Security clearance for the location
- Security clearance for personnel involved in testing
- Licenses to store and handle the threat items

A.8 Identify and establish laboratory consistency methods

A.8.1 Identify peer assessment methods of inter and intra-laboratory and proficiency testing:

Current Status:
Some E&W detection equipment is large and fragile and not built for transporting and installing on a regular base. Moreover, testing of Aviation security equipment is generally expensive. Therefore, frequently installing and disassembling the same machine in one (intra-lab) or more (interlab) labs for proficiency testing is not practically and economically achievable and is currently not done.

45. Potential Implementation:

Consistency of test results should be determined within the same laboratory over time as well as between different laboratories. A test execution protocol should be developed depending on the product type to which it applies.
For people screening portals a high repeatability of security performance tests can be obtained when one or more of the following measures are included in the test protocol:

- A large number and wide variety (gender, BMI) of test persons;
- Prescribed type of garment and threat attachment methods;
- Prescribed location, orientation and concealment of the threat item.

The effectiveness for the repeatability on these measures must be investigated in order to develop a good TM.

The repeatability of security evaluation of ETD can be improved if the following parts are included in the test protocol:

- Exclude solvents that cause false alarms for testing of volatile compounds;
- Sample preparation and measurement for non-volatile compounds have to be performed on the same working day;
- The use of single source test materials is mandatory.

Testing only samples which can be prepared with a high accuracy will improve the repeatability. A meaningful testing will however require additionally more realistic samples with a lower repeatability.

A proficiency test protocol should be developed for each scheme. A standard test piece is a possible way forward for proficiency tests. Each EB should have the same test piece and during the evaluation of equipment this test piece is scanned. The scans are a benchmark which can be used to assess difference between labs and differences over time in the same lab.

Additionally, laboratory consistencies can also be supported by regular inter-lab visits of EB representatives during testing to learn from each other and to assure that the test is performed correctly and consistently.

Realistic and adversarial testing for the people screening portal evaluation can be done by: using test persons instead of automatic frames and allowing deviant human behaviour during scanning, applying different levels of divestment, and carrying simultaneously threat items and benign items.

46. Adversarial testing for ETD equipment can be done for example by masking threat substances by a huge amount of interfering substances or by overloading the system with high concentrations of target substances.

A.8.2 Identify accreditation needs:

Current Status:
Accreditation is not a prerequisite for ECAC Test Centres (TCs) but all TCs are under surveillance of their national authorities. The French ECAC Test centre STAC has an ISO 17025-accreditation for EDS and ETD-Tests.

47. Potential Implementation:

Accreditation requirements and rules should be set by the System Owner. The test laboratories take the task of evaluation bodies (EBs) and might be accredited against ISO 17025:2005 for each relevant test method. This could also be achieved by a peer assessment process where the other participating EBs review whether all processes are correctly implemented.

The Certification Body (CB) actually issuing the certificates should be a centralised body attached to for example EC JRC or IRMM, and needs an accreditation against ISO 17065:2012.

A.9 Identify surveillance methods

A.9.1 Identify surveillance of production scope and QMS:

Current Status:
Surveillance of production scope and QMS is not included in the current ECAC-CEP for the Aviation security application. Nevertheless there are various national efforts to guarantee that not only the actual tested product fulfils the requirements but that all subsequent examples of the same

type also are in conformity. For example in Germany every single instrument to be purchased has to pass a reduced test before it is put into operation.

Potential Implementation:
Manufacturers which are certified to ISO 9001 are surveyed under this scheme. For those which are not certified the scheme should implement at least a third party surveillance of the QMS or the production process. Periodic testing of production samples could be done with a reduced test method

A.9.2 Identify scope of surveillance test methods:

Current Status:
Aviation security: Surveillance according to ISO/IEC definitions stating production conformity of new samples taken from the market is currently not part of the ECAC scheme. Although not really "surveillance testing", tests whether the security performance of installed security equipment is still according to the standard for which the equipment has been certified is done by means of Routine Testing (RT) at location, i.e. at an airport checkpoint.
EU Regulation EC2015-1998 prescribes in Article 12 "There shall be routine testing of each piece of security equipment", but it does not specify the frequency or how routine testing should be done. Currently, it is not centrally arranged (e.g. by ECAC-CEP), so there is no official procedure. Execution of routine testing is the responsibility of the national authorities and they have developed their own procedures.
However, some progress has been made on ECAC-CEP study group level. The Technical Task Force (TTF) is working on the implementation at ECAC-level and has instructed the study groups to install a routine test for each product type. The EDS Study Group has already developed a routine testing methodology based on a well-defined "test piece", which is adopted by most member states. The SSc Study Group is currently developing a RT procedure, but due to the large number of parameters that affect detection performance for person screening equipment, the development of a test piece (actually test person) is much more complicated than for EDS.

Potential Implementation:

48. A periodic surveillance test programme based on a reduced selection from the respective TMs or based on a test piece should be defined for all product types and applications to guarantee that a system under permanent operation still fulfils the requirements .

A.9.3 Identify periodicity and consistency of surveillance:

Current Status:
Aviation security: Surveillance according to ISO/IEC definitions does not take place yet. Only routine testing is performed on irregular intervals. Furthermore, daily or weekly basic function tests by the operators are commonly used to guarantee the correct basic function of installed systems (operational routine testing).
Beyond that for example in Germany recently a national security plan foresees a regular (yearly or half-yearly) validation test with a reduced test for all installed systems.

Potential Implementation:
The periodicity of surveillance cannot be fixed in advance.

49. A starting period of 1.5 years between the inspections of the manufacturers like in the accreditation according to ISO 17025 may be applicable.

A.9.4 Identify validity of certificate:

Current Status:
The evaluation of Aviation security equipment according to the ECAC-CEP scheme is valid for the same type of device and for the sensitivity setting / detection algorithm as tested. The validity can be withdrawn in case of:

- A new detection algorithm. A re-play of the raw data with the new algorithm can be done to certify the new algorithm
- A change to the hardware or software. These changes should be reported to the scheme holder who will evaluate whether the change is critical (i.e. the security performance has changed) and a new full test is required.
- The requirements are changed (other detection limits / other threat list) and meeting the “old” requirements is considered obsolete. In this case a new full test is required.

Potential Implementation:
The current Aviation security validity can be applied for non Aviation security E&W detection products. The validity of a certificate can furthermore be limited for a time period, after which a reduced test has to be passed to renew the certificate. Moreover, if a surveillance method is implemented it should be identified how the validity of the certificate is affected by surveillance test results. This can for example be a temporary or a permanent withdrawal of the certificate.
A new certificate can be issued after re-evaluation. In case of a new detection algorithm a re-play of the raw data with the new algorithm might be sufficient, if critical changes of hard- or software have been made or the requirements are changed a full retest has to be done.

50.

Annex B HECTOS Roadmap Elements

B.1 I. Dissemination and awareness building

Objective	To build awareness of, interest for, engagement in, acceptance of and support for the harmonized European certification framework developed by HECTOS among key stakeholder groups
Activity	The aim is to bring together the key stakeholders for a later implementation of the harmonized European certification framework and discuss its characteristics and advantages. The objectives and the scope of the framework as well as the fact that the framework is not a threat to currently existing schemes needs to be explained and emphasized. HECTOS findings need to be validated with stakeholders iteratively. This activity can include: • Using the HECTOS stakeholder group for presentation and discussion of the certification framework • Getting key stakeholders involved in the CWA development process • Involving key stakeholders in the HECTOS final event • Holding workshops within the HECTOS project
Status quo	There is no platform to discuss and support a common European approach for a harmonized certification framework for physical security products. Several key stakeholders are involved in the HECTOS stakeholder group and the CWA development process. More effort is needed in order to strengthen interest and generate willingness to actively support the initiative.
Leading body	This activity is part of the last stage of HECTOS. The HECTOS project coordinator and assigned HECTOS dissemination partner are leading.
Involved bodies	Besides HECTOS partners as many stakeholders as possible should be involved in this activity. Those will be e.g. representatives from the European Commission, certification bodies, evaluation bodies, products associations, physical security product manufacturers and standardization bodies.
Relation to subsequent roadmap elements	*B.2 – II.* CWA Development*:* The harmonized European certification framework as discussed with stakeholders is defined in a standard document. Interested stakeholders from this activity are needed to engage in the CWA development. *B.3 – III. Endorsement of* roadmap implementation*:* This roadmap element (I) builds the necessary foundation for discussions and endorsement of the harmonized certification framework after the end of the project.

B.2 II. CWA Development

Objective	To build a foundation for the harmonized European certification framework to be established
Activity	On European level, a standardization document, namely a CEN Workshop Agreement (CWA), to document the concept of a harmonized certification framework for physical security products is to be developed together with interested stakeholders. HECTOS as a project and the HECTOS project coordinator as the initiator submitted a standardization proposal with support of DIN as a Standard Developing Organization to CEN/CENELEC. The project plan has been accepted by the CEN/CENELEC Management Centre (CCMC) and its affiliated technical committees. In order to develop the harmonized certification framework, HECTOS partners contribute relevant research findings. Those are to be discussed and joined with the involved stakeholder's perspectives. Ultimately a broadly accepted approach for a harmonized European certification framework will be published.
Status quo	A European harmonized certification framework for physical security products has not been developed before. The ISO 17000 series gives general guidance on certification and conformity assessment aspects but does not offer a specific guidance in the field of physical security. The development of the CWA will be completed by the end of the HECTOS project.
Leading body	The HECTOS project coordinator (CEN Workshop Chairman) and HECTOS Dissemination Leader (CEN Workshop Vice-chair) are responsible.
Involved bodies	Besides HECTOS partners, as many stakeholders as possible should be involved in this activity. This means especially certification bodies, evaluation bodies, products associations, physical security product manufacturers and representatives from the European Commission.
Relation to subsequent roadmap elements	*B.3 – III. Endorsement of* roadmap implementation*:* This activity (II) builds the necessary foundation for discussions and endorsement of the harmonized certification framework after the projects end. *0 –* *VII. Establishment of common certification* mark and database*:* The CWA lays out the basic structures and processes of the harmonized European certification framework which will be the basis for a common certification mark and database. *B.9 – IX. Development of a phased* implementation plan*:* The development of a phased implementation plan for the harmonized European certification framework and especially the decision about a pilot physical security certification system will require the organizational and processual structures described in the CWA. *B.11 – Implementation and operation of pilot certification* system and schemes*:* The implementation of a pilot system will require the organizational and processual structures described in the CWA.
Milestone	Publication of CWA on harmonized European certification framework

B.3 III. Endorsement of roadmap implementation

Objective	To endorse the framework and roadmap by stakeholders, which are needed for the implementation of the framework
Activity	Acceptance of the framework by the relevant stakeholders is an important factor determining its success. Once the HECTOS project has ended, the designed harmonized European certification framework needs to be taken up by engaged, willing stakeholders. Adjustments of the framework including an update of the CWA are possible and can be discussed in this context. A suitable and committed stakeholder group needs to come to a mutual agreement about the architecture of the framework and make the formal decision for its implementation. This activity can include: • Establishing a stakeholder discussion platform for continuous exchange and consensus finding with regard to the framework, its implementation and leading organizations
Status quo	Dissemination activities and discussions have been initiated by the HECTOS project in the context of roadmap elements (B.1) and (B.2).
Leading body	*The European Commission, the CEN/CENELEC Management Centre or another independent entity/consortium that could take on the responsibility as the System Group Coordinator can be leading this activity.*
Involved bodies	As many stakeholders as possible should be involved in this activity. This means especially certification bodies, evaluation bodies, products associations, physical security product manufacturers and representatives from the European Commission and CEN/CENELEC.
Relation to subsequent roadmap elements	*B.4 – IV. Business* plan definition*:* A formal decision to implement the harmonized European certification framework is strongly connected to the question about a valid business plan coming along with it. A potential system group coordinator will depend on a viable business model. The two activities go hand in hand. *0 –* *V. Formation of system* group coordinator*:* A formal decision to implement the harmonized European certification framework is required to appoint a system group coordinator who is going to be responsible for its management.
Milestone	Decision to proceed with implementation of the harmonized European certification framework

B.4 IV. Business plan definition

Objective	To create a valid business model
Activity	A harmonized European certification framework needs an entity that is able to take control and responsibility for the approach. This entity will only be able to manage the framework if there is a valid and sustainable business model to maintain the required efforts. This business model needs to be defined together with relevant parties. This activity can include: • Defining a management profile including involved personnel and the evaluation of target markets • Defining a marketing plan, key resources and activities • Performing a financial analysis • Performing an environmental analysis • Defining a specific implementation plan • Performing a risk analysis
Status quo	For the management of the dedicated harmonized European certification framework no business plan exists so far. However, similar approaches exist on other levels. For instance the IEC Conformity Assessment Board is managing a group of international harmonized conformity assessment systems which certify to various IEC standards. The CEN/CENELEC Keymark is another harmonized certification framework. Neither of these focuses on physical security products. Experiences and advice from these and various physical security scheme owners should be considered.
Leading body	*The European Commission, the CEN/CENELEC Management Centre or another independent entity/consortium that could take on the responsibility as the system group coordinator can be leading this activity.*
Involved bodies	The future system group coordinator(s), CCMC and/or certification and conformity assessment bodies should be involved.
Relation to subsequent roadmap elements	*0 –* *V. Formation of system* group coordinator*:* A defined business plan is required for a potential system group coordinator, which is going to be responsible for the management of the framework, to commit itself.
Milestone	Definition and verification of the sustainable business plan for management of a harmonized European certification framework

B.5 V. Formation of system group coordinator

Objective	To assign a system group coordinator, who will be responsible for the implementation and management of the certification framework
Activity	The implementation of a harmonized European certification framework, based on the business plan and roadmap, needs a leader to coordinate the collaborations and implementation steps. The system group coordinator is responsible for defining, monitoring and enforcing the underlying rules, procedures, management, and coordination among the different certification systems it bridges, including upholding the rules and requirements of the security mark.
Status quo	n/a
Leading body	The European Commission, the CEN/CENELEC Management Centre or another entity that could take on the responsibility as the system group coordinator can be leading this activity. CEN/CENELEC could be a candidate to take on the role as system group coordinator, since it operates the pan-European Keymark certification system. The IEC Conformity Assessment Board (IEC CAB) could also be a candidate since it operates certification systems at an international level. Note that neither of the organizations currently have any schemes for physical security products. A consortium of certification bodies could be another option.
Involved bodies	The future system group coordinator(s), CCMC or certification and conformity assessment bodies should be involved.
Relation to subsequent roadmap elements	*B.6 – VI. Definition of physical security* certification systems*:* Once this activity (V) is finished, the definition and classification of physical security certification systems within the harmonized European certification framework can be started under the lead of the system group coordinator and in cooperation with the stakeholder communities. *0 –* *VII. Establishment of common certification* mark and database*:* The system group coordinator needs to drive forward the establishment of a common certification mark and database. *0 –* *VIII. Establishment of cooperation between system group coordinator* and ESOs*:* The system group coordinator will be the contact point and responsible entity for cooperation with the ESOs.
Milestone	System group coordinator to manage the harmonized European certification framework formed

B.6 VI. Definition of physical security certification systems

Objective	To have a clear overall hierarchical structure of systems and underlying schemes that are part of the harmonized European certification framework and define its limits. This should be clear to the relevant stakeholders, e.g. a manufacturer should be able to distinguish to which system and scheme his product can be certified.
Activity	Define the set of physical security certification systems that will be in the harmonized European certification framework. Criteria need to be defined and applied in order to merge products and product groups into specific physical security certification systems for which common sets of rules can be applied. *A starting point for this can be the set of product categories defined by HECTOS*
Status quo	HECTOS has carried out an analysis of the physical security products, applications, standards and certification landscapes and has proposed an initial system structure that can be discussed in the community.
Leading body	The system group coordinator should be leading this activity.
Involved bodies	Representatives from certification bodies, evaluation bodies, products associations, physical security product manufacturers and standards bodies should be involved.
Relation to subsequent roadmap elements	*B.9 – IX. Development of a phased* implementation plan*:* The defined physical security certification systems will be the basis for the development of a phased implementation plan of the harmonized European certification framework.
Milestone	Defined physical security certification systems

B.7 VII. Establishment of common certification mark and database

Objective	To establish a security mark, the rules for applying the mark and an associated data base of certified physical security products
Activity	The external 'brand' of the overall certification framework can be asserted by a security specific quality mark, the security mark, which is to be applied to all certified products. The mark details and the rules associated with its application, including means for certificate publication, will be detailed under this activity. A central feature of the security mark and framework brand is a central database managed at the system group level which accommodates the certificates generated within the schemes of the framework.
Status quo	n/a
Leading body	The system group coordinator should be leading this activity.
Involved bodies	Representatives from certification bodies, evaluation bodies, products associations, physical security product manufacturers, the European Commission and CEN/CENELEC should be involved.
Relation to subsequent roadmap elements	*B.11 – Implementation and operation of pilot certification* system and schemes*:* The set-up of a security mark and database is crucial for the implementation and operation of the pilot systems and schemes.
Milestone	Security mark/database operational

B.8 VIII. Establishment of cooperation between system group coordinator and ESOs

Objective	To activate an effective cooperation between the System Group Coordinator and the European Standards Organizations (ESOs) in order to develop relevant documents (product and measurement standards) needed to implement the harmonized European certification framework
Activity	A strategic cooperation between the System Group Coordinator and the ESOs should be established. The system group coordinator will address the proper organizational units in order to set up communication channels. This will be necessary to instate an efficient work flow when it comes to the definition of rules, procedures and guidance as standards documents for the operation of the harmonized European certification framework later on. This activity can include: • Defining contact points and communication channels on strategical as well as on system and scheme level (e. g. regular meetings and/or web conferences) • Defining a pre-standardization work flow for the development of needed standards in terms of rules, procedures and guidance *Particular effort should be put on effectiveness of the procedures for standards development and update in order to keep standards up-to-date with respect to the current threat.*
Status quo	n/a
Leading body	The system group coordinator needs to be leading this activity.
Involved bodies	The ESOs need to be involved.
Relation to subsequent roadmap elements	*B.10 – Development of general rules, procedures and guidance:* The development of the general rules and procedures which will apply for the operation of the harmonized European certification framework on system and scheme level will be documented in standards through the relevant technical standardization committees. *B.11 – Implementation and operation of pilot certification system and schemes:* For the implementation of a pilot system specific rules and procedures which will apply for the particular system need to be documented in standards.

B.9 IX. Development of a phased implementation plan

Objective	To define an implementation process for the integration of physical security certification schemes and systems in the harmonized European certification framework
Activity	In order to integrate the defined physical security certification schemes and systems in the harmonized European certification framework a phased implementation plan needs to be developed. Different physical security certification systems will imply different specific starting points, requirements, involved parties, legal frameworks etc. For a promising start of the framework it will be essential to define which physical security certification systems are suitable to begin with. Criteria for the selection of one or several suitable physical security certification system(s) need to be defined. This includes the identification of opportunities, gaps and barriers. *Criteria for the selection of a pilot physical security certification system include e.g.:* • Market size for relevant products (since there needed to be market demand in order to sustain the certification schemes financially) • Number of existing measurement or performance standards (well accepted European/ International standards are a prerequisite for harmonized schemes; if these already exist then it will be faster to set up the pilot system) • Number of existing certification systems and schemes (since it will be more challenging to set up a harmonized system if a number of different schemes and systems are already well established) The template for establishing a certification system and scheme defined in the CWA needs to be followed. The different aspects covered in there need to be analyzed to identify necessary activities with regard to the pilot system. This activity can include: • Organizing workshops to define the implementation plan and discuss potential pilot systems *The HECTOS research has identified 3 candidates for the pilot certification system:* • Radiological and Nuclear Detection equipment; • Explosives and Weapon Detection equipment for aviation security; • Biometrics products.
Status quo	The research results provided by HECTOS can be used as basic material. HECTOS deliverable D8.1 and D8.2 provide relevant information that can support the definition of an implementation plan and selection of a pilot certification system.
Leading body	The system group coordinator needs to lead this activity.
Involved bodies	Representatives from certification bodies, evaluation bodies, products associations and physical security product manufacturers should be involved.
Relation to subsequent roadmap elements	*B.11 – Implementation and operation of pilot certification* system and schemes*:* The phased implementation plan will be a foundation for the implementation of a pilot system and schemes itself.
Milestone	Adoption of the phased implementation plan and selection of pilot physical security certification system(s)

B.10X. Development of general rules, procedures and guidance

Objective	To establish common, high-level rules, procedures and guidance on multiple aspects of the certification, accreditation and standardization for the harmonized European certification framework in order to decrease the effort needed for each system and scheme.
Activity	Each system and scheme applying the harmonized European certification framework should develop rules, procedures and guidance specific to that system and scheme. This roadmap element proposes to develop a set of high-level rules, procedures and guidelines that can be used as guiding principles at the system group level. *These general rules, procedures and guidelines include the establishment of :* • Procedures to include or make normative reference to classified information in European standards • General rules for the appointment of evaluation bodies • Requirements for high-level inter and intra laboratory evaluation procedures • Guidance on how to write standards for physical security products • Guidance on how to write test methods for physical security products • Guidance on how to write proficiency testing methods for physical security products • Guidance on how to write surveillance methods for physical security products These rules, guidelines and procedures can be published as standardization documents. In order to do so, suitable working groups within relevant technical committees of the ESOs can be established as far as they do not yet exist.
Status quo	Limited formal guidance on rules and procedures for security product certification exists. For instance, the Common Evaluation Process (CEP) of security equipment, which is a program managed by the European Civil Aviation Conference (ECAC) and carried out by a small group of dedicated test centers in member states, supports the evaluation of the security performance of different explosives and weapons detection products and checks whether it meets the performance requirements established in European Regulations.
Leading body	The system group coordinator needs to initiate and coordinate this activity.
Involved bodies	Working groups in formal technical standardization committees should develop these principles. This includes representatives from certification bodies, evaluation bodies, products associations and physical security product manufacturers.
Relation to subsequent roadmap elements	*B.11 – Implementation and operation of pilot certification system and* schemes*:* General rules, procedures and guidance will be a foundation for the implementation of a pilot system and schemes itself.
Milestone	Published guidance document(s) (standard or similar)

B.11 XI. Implementation and operation of pilot certification system and schemes

Objective	To validate the functionality, effectiveness and economic viability of the harmonized European certification framework in an operational context; To illustrate how the framework can be flexibly applied according to the needs and constraints of a particular system (product group); To test and verify template activities by establishing a new system and new schemes
Activity	The developed phased implementation plan will be applied to the pilot physical security certification system. System and scheme owners will be appointed and scheme operators identified. The system will go into operation as part of the harmonized European certification framework. The operation of the system will be a continuous activity.
Status quo	n/a
Leading body	The system group coordinator and pilot system owner need to lead this activity.
Involved bodies	Specific stakeholders from the pilot physical security certification system such as relevant certification bodies, evaluation bodies, products associations and physical security product manufacturers should be involved.
Relation to subsequent roadmap elements	*B.12 – XII. Monitoring of operational effectiveness of certification* systems and schemes*:* The implementation and especially the operational effectiveness of the pilot system and schemes will be monitored.

B.12XII. Monitoring of operational effectiveness of certification systems and schemes

Objective	To evaluate and monitor the pilot system and schemes; To support, monitor and continuously evaluate the expansion to other security systems; To feedback lessons learned during the implementation and operation of systems and schemes into the framework architecture
Activity	The piloting, monitoring and evaluation of the process will lead to improvements and new perceptions for expanding the certification framework to other physical security certification systems. This activity is expected to be extensive during piloting and early expansion, and later continues as a leaner systematic monitoring.
Status quo	n/a
Leading body	The system group coordinator needs to lead this activity.
Involved bodies	Specific stakeholders from the pilot physical security certification system such as relevant certification bodies, evaluation bodies, products associations and physical security product manufacturers should be involved. After expansion to other physical security certification systems, the corresponding stakeholders should be involved.
Relation to subsequent roadmap elements	*B.13 – XIII. Expansion to other physical* security certification systems*:* The expansion to other physical security certification systems will be the next logical step.
Milestone	Operational effectiveness of the harmonized European certification framework for pilot physical security certification systems evaluated – Decision about expanding to other physical security certification systems

B.13XIII. Expansion to other physical security certification systems

Objective	To expand the harmonized European certification framework from the pilot system to other physical security certification systems
Activity	Once the implementation is executed and the operational effectiveness has been evaluated positively, an expansion of the harmonized European certification framework to other physical security certification systems according to the phased implementation plan can be initiated. Deviations might be occurring due to the knowledge obtained through the past experiences. For each added system the steps (B.11) and (B.12) will need to be performed similarly.
Status quo	n/a
Leading body	The system group coordinator needs to lead this activity.
Involved bodies	Specific stakeholders from corresponding physical security certification systems such as relevant certification bodies, evaluation bodies, products associations and physical security product manufacturers should be involved.
Relation to subsequent roadmap elements	*B.12 – XII. Monitoring of operational effectiveness of certification* systems and schemes*:* The implementation and operational effectiveness of additional physical security certification systems and schemes will be monitored.

Annex C Overview of Technical Committees and Standards

C.1 Prevent

CEN	TC/WG	Title	Scope
CEN	TC 162	Protective clothing including hand and arm protection and lifejackets	To prepare European Standards (requirements and testing) in the field of clothing to protect against physical and chemical hazards. Hand and arm protectors are included as well as high visibility clothing and clothing against drowning (e.g. lifejackets).
CEN	TC 192	Fire and Rescue Service Equipment	Standardization of equipment and vehicles for rescue and firefighting, excluding personal protective equipment and that covered by CEN/TC 191.
CEN	TC 212	Pyrotechnic articles	Standardization of fireworks, theatrical pyrotechnic articles, pyrotechnic articles for vehicles and other pyrotechnic articles, particularly from the point of view of their safe use.
CEN	TC 239	Rescue systems	To define standards for emergency for emergency medical vehicles and the equipment thereof as well as for first aid equipment, in the interests of providing safe and comfortable transport and preclinical treatment for patients.
CEN	TC 160	Fertilizers and liming materials	Standardization of specifications for firefighters helmets
CEN	TC 263	Secure storage of cash, valuables and data media	Standardization in the field of physical security of products which provide secure storage of cash, valuables and data media in terms of resistance to fire and also including high security locks.
CEN	TC 305	Potentially explosive atmospheres - Explosion prevention and protection	To develop standards where necessary in the fields of: - test methods for determining the flammability characteristics (ignition, propagation, explosion effects, etc.) of substances; - equipment and protective systems for use in potentially explosive atmospheres and equipment and systems for explosion prevention and protection.

CEN	TC/WG	Title	Scope
CEN	TC 321	Explosives for civil uses	Standardization of explosives substances and articles, including safety requirements, terminology, categorization and test methods. Pyrotechnic articles and ammunition are excluded and explosives intended for use by the armed forces ot the police are also excluded.
CEN	TC 325	Crime prevention through building, facility and area design	Development of European standards for the prevention of crime at industrial facilities, educational institutions, hospitals, residential building areas, department stores, squares and public meeting places through building, facility and area design. The standards will include their area of application, the corresponding strategy, security levels, building and area layout, application of construction elements, roads and pavements. The standards may be applied to new and significantly refurbished buildings, facilities and areas. The standards will not deal with building products and security systems components.
CEN	TC 388	Perimeter Protection	Standardisation in the field of perimeter protection including systems and products (as part of the system) from the security perspective point of view, without neglecting safety aspects

CEN	TC/WG	Title	Scope
CEN	TC 391	Societal and Citizen Security	The main objective of CEN/TC 391 is to elaborate a family of European standards, standard-like documents (e.g. procedures, guidelines, best practices, minimal codes of practice and similar recommendations) in the Societal and Citizen Security sector including aspects of prevention, response, mitigation, continuity and recovery before, during and after a destabilising or disruptive event. Verification and training will also be considered. CEN/TC 391 will not deal with issues already dealt in other TCs. Concerning technology, CEN/TC 391 may identify needs in product standardisation, but this will not lead to direct action by this CEN/TC. These issues shall be communicated to those CEN, ISO or other TCs working within the framework of these specific products. Where other TCs do not address the identified areas, then CEN/TC 391 will develop the standard(s) or proposed deliverables where appropriate. The standardisation activities will consider the following main issues related to Societal and Citizen Security: - Products and services (equipment, communication, information, goods, transport, energy, cultural inheritance and properties); - Infrastructures (roads, ports, airports, rail stations, bridges, factories...); - Stakeholder needs and requirements, potential conflicts; - Relationship (cultural and geographical diversity); - Citizen requirements and vulnerabilities, including privacy.
ISO	TC 92	Fire safety	
ISO	TC 94	Personal safety -- Personal protective equipment	
ISO	TC 109	Oil and gas burners	Establishment of safety rules for the construction and installation: - of lifts and service lifts; - of escalators and passenger conveyors.
ISO	TC 161	Controls and protective devices for gas and/or oil	Standardization of specifications for firefighters helmets

CEN	TC/WG	Title	Scope
ISO	TC 264	Fireworks	Standardization of methods for air quality characterization of emissions, ambient air, indoor air, gases in and from the ground and deposition, in particular measurement methods for air pollutants (for example particles, gases, odours, micro organisms) and methods for the determination of the efficiency of gas cleaning systems. Excluded are: - the determination of limit values for air pollutants; - workplaces and clean rooms; - radioactive substances.
ISO	TC 292	Security and resilience	
CLC	TC 31	Electrical apparatus for potentially explosive atmospheres	
CLC	SR 45	Nuclear instrumentation	

C.2 Detect

CEN	TC/WG	Title	Scope
CEN	TC 210	GRP tanks and vessels	Standardization of tanks and vessels made of glassfibre reinforced thermosetting resins (GRP) - for storage and processing, - factory made and site built, - non pressurized and pressurized, - for use above or under ground, - with or without linings, - for fluids and solids.
CEN	TC 212	Pyrotechnic articles	Standardization of fireworks, theatrical pyrotechnic articles, pyrotechnic articles for vehicles and other pyrotechnic articles, particularly from the point of view of their safe use.
CEN	TC 160	Fertilizers and liming materials	Standardization of specifications for firefighters helmets
CEN	TC 263	Secure storage of cash, valuables and data media	Standardization in the field of physical security of products which provide secure storage of cash, valuables and data media in terms of resistance to fire and also including high security locks.

CEN	TC/WG	Title	Scope
CEN	TC 264	Air quality	Standardization of methods for air quality characterization of emissions, ambient air, indoor air, gases in and from the ground and deposition, in particular measurement methods for air pollutants (for example particles, gases, odours, micro organisms) and methods for the determination of the efficiency of gas cleaning systems. Excluded are: - the determination of limit values for air pollutants; - workplaces and clean rooms; - radioactive substances.
CEN	TC 286	Liquefied petroleum gas equipment and accessories	Standardization of all pressure equipment and transport pressure equipment for liquefied petroleum gas, including associated accessories. Scope to include design, manufacture, inspection and testing, and operational requirements, but excluding pipelines, and cartridges of 1 liter and below.
CEN	TC 295	Residential solid fuel burning appliances	Standardization in the field of residential heating and cooking appliances burning solid fuels: to include solid mineral fuel burning appliances, wood- burning appliances and multifuel appliances. The standardization to cover appliance construction, performance, (e.g. efficiency and emissions), safety and commissioning requirements, together with their associated test methods and installation and operating instructions. The standardization of test fuels and test methods for the assessment of the suitability of fuels for the various appliance types.
CEN	TC 296	Tanks for het transport of dangerous goods	Standardization of design, construction, inspection and testing of metallic tanks intended for transport of dangerous goods of a capacity of more than 450 l. It shall cover tanks of road tankers, tanks of rail-tank-wagons and tanks intended for multimodal transport. "Tank" means the shell and all relevant equipments.

CEN	TC/WG	Title	Scope
CEN	TC 305	Potentially explosive atmospheres - Explosion prevention and protection	To develop standards where necessary in the fields of: - test methods for determining the flammability characteristics (ignition, propagation, explosion effects, etc.) of substances; - equipment and protective systems for use in potentially explosive atmospheres and equipment and systems for explosion prevention and protection.
CEN	TC 321	Explosives for civil uses	Standardization of explosives substances and articles, including safety requirements, terminology, categorization and test methods. Pyrotechnic articles and ammunition are excluded and explosives intended for use by the armed forces ot the police are also excluded.
CEN	TC 325	Crime prevention through building, facility and area design	Development of European standards for the prevention of crime at industrial facilities, educational institutions, hospitals, residential building areas, department stores, squares and public meeting places through building, facility and area design. The standards will include their area of application, the corresponding strategy, security levels, building and area layout, application of construction elements, roads and pavements. The standards may be applied to new and significantly refurbished buildings, facilities and areas. The standards will not deal with building products and security systems components.
CEN	TC 388	Perimeter Protection	Standardisation in the field of perimeter protection including systems and products (as part of the system) from the security perspective point of view, without neglecting safety aspects

CEN	TC/WG	Title	Scope
CEN	TC 391	Societal and Citizen Security	The main objective of CEN/TC 391 is to elaborate a family of European standards, standard-like documents (e.g. procedures, guidelines, best practices, minimal codes of practice and similar recommendations) in the Societal and Citizen Security sector including aspects of prevention, response, mitigation, continuity and recovery before, during and after a destabilising or disruptive event. Verification and training will also be considered. CEN/TC 391 will not deal with issues already dealt in other TCs. Concerning technology, CEN/TC 391 may identify needs in product standardisation, but this will not lead to direct action by this CEN/TC. These issues shall be communicated to those CEN, ISO or other TCs working within the framework of these specific products. Where other TCs do not address the identified areas, then CEN/TC 391 will develop the standard(s) or proposed deliverables where appropriate. The standardisation activities will consider the following main issues related to Societal and Citizen Security: - Products and services (equipment, communication, information, goods, transport, energy, cultural inheritance and properties); - Infrastructures (roads, ports, airports, rail stations, bridges, factories...); - Stakeholder needs and requirements, potential conflicts; - Relationship (cultural and geographical diversity); - Citizen requirements and vulnerabilities, including privacy.
CEN	TC 23	Transportable gas cylinders	

CEN	TC/WG	Title	Scope
CEN	TC 72	Fire detection and fire alarm systems	To prepare standards, harmonised where necessary to meet the essential requirement 'Safety in case of fire' of the Construction Products Directive, in the field of fire detection and fire alarm systems in and around buildings, covering test methods, requirements and recommendations for: - components; - the combination of components into systems; - the planning, design and installation of systems for use in and around buildings; - usage, maintenance and servicing; - the connections to and control of other fire protection systems; - the combination with other systems to form integrated systems; - the combination with fixed firefighting systems; - the contribution of fire detection and fire alarm systems to fire safety engineering.
CEN	TC 85	Eye protective equipment	
ISO	TC 21	Equipment for fire protection and fire fighting	Standardization of equipment and vehicles for rescue and firefighting, excluding personal protective equipment and that covered by CEN/TC 191.
ISO	TC 28	Petroleum and related products, fuels and lubricants from natural or synthetic sources	Standardization of metallic tanks, shop fabricated and site-built, for the storage of liquids with an internal gas pressure approximating to atmospheric pressure. The standardization may include performance requirements and product descriptions together with necessary test methods and requirements concerning the evaluation of conformity.
ISO	TC 54	Essential oils	Standardization of transportable gas cylinders, their fittings, and requirements relating to their design, testing and operation. The scope does not include LPG cylinder covered by CEN/TC 286 or non-refillable cartridges covered by CEN/TC 157. The scope does not include containers for cryogenic gases covered by CEN/TC 268.
ISO	TC 158	Analysis of gases	To standardize guidance on fire precautions for ventilation and air conditioning systems.

CEN	TC/WG	Title	Scope
ISO	TC 161	Controls and protective devices for gas and/or oil	Standardization of specifications for firefighters helmets
ISO	TC 185	Safety devices for protection against excessive pressure	The JWG shall develop test methods for testing permeation of chemicals through materials for use in protective footwear, gloves and clothing.
ISO	TC 264	Fireworks	Standardization of methods for air quality characterization of emissions, ambient air, indoor air, gases in and from the ground and deposition, in particular measurement methods for air pollutants (for example particles, gases, odours, micro organisms) and methods for the determination of the efficiency of gas cleaning systems. Excluded are: - the determination of limit values for air pollutants; - workplaces and clean rooms; - radioactive substances.
ISO	TC 292	Security and resilience	
CLC	TC 31	Electrical apparatus for potentially explosive atmospheres	
CLC	SR 45	Nuclear instrumentation	
CLC	TC 79	Alarm systems	To prepare harmonized standards for detection, alarm and monitoring systems for protection of persons and property, and for elements used in these systems. The scope includes in particular intruder and hold-up alarm systems, access control systems, periphery protection systems, combined alarm - fire alarm systems, social alarm systems, CCTV-systems, other monitoring and surveillance systems related to security applications, as well as associated and dedicated transmission and communication systems. The standards shall specify conformity tests.
CLC	TC 216	Gas detectors	

C.3 Mitigate

CEN	TC/WG	Title	Scope
CEN	TC 114	Safety of machinery	The standardization of general principles for safety of machinery incorporating terminology and methodology.
CEN	TC 129	Glass in building	Standardization in the field of glass used in building including: - definitions of all types of glass products, basic and processed; - definition of characteristics; - test methods for measurement of characteristics; - calculation methods for characteristics; - requirements e.g. durability; - classifications e.g. anti-bandit glazing; - glazing methods.
CEN	TC 162	Protective clothing including hand and arm protection and lifejackets	To prepare European Standards (requirements and testing) in the field of clothing to protect against physical and chemical hazards. Hand and arm protectors are included as well as high visibility clothing and clothing against drowning (e.g. lifejackets).
CEN	TC 239	Rescue systems	To define standards for emergency for emergency medical vehicles and the equipment thereof as well as for first aid equipment, in the interests of providing safe and comfortable transport and preclinical treatment for patients.
CEN	TC 325	Crime prevention through building, facility and area design	Development of European standards for the prevention of crime at industrial facilities, educational institutions, hospitals, residential building areas, department stores, squares and public meeting places through building, facility and area design. The standards will include their area of application, the corresponding strategy, security levels, building and area layout, application of construction elements, roads and pavements. The standards may be applied to new and significantly refurbished buildings, facilities and areas. The standards will not deal with building products and security systems components.

CEN	TC/WG	Title	Scope
CEN	TC 388	Perimeter Protection	Standardisation in the field of perimeter protection including systems and products (as part of the system) from the security perspective point of view, without neglecting safety aspects
CEN	TC 391	Societal and Citizen Security	The main objective of CEN/TC 391 is to elaborate a family of European standards, standard-like documents (e.g. procedures, guidelines, best practices, minimal codes of practice and similar recommendations) in the Societal and Citizen Security sector including aspects of prevention, response, mitigation, continuity and recovery before, during and after a destabilising or disruptive event. Verification and training will also be considered. CEN/TC 391 will not deal with issues already dealt in other TCs. Concerning technology, CEN/TC 391 may identify needs in product standardisation, but this will not lead to direct action by this CEN/TC. These issues shall be communicated to those CEN, ISO or other TCs working within the framework of these specific products. Where other TCs do not address the identified areas, then CEN/TC 391 will develop the standard(s) or proposed deliverables where appropriate. The standardisation activities will consider the following main issues related to Societal and Citizen Security: - Products and services (equipment, communication, information, goods, transport, energy, cultural inheritance and properties); - Infrastructures (roads, ports, airports, rail stations, bridges, factories...); - Stakeholder needs and requirements, potential conflicts; - Relationship (cultural and geographical diversity); - Citizen requirements and vulnerabilities, including privacy.
CEN	TC 85	Eye protective equipment	
ISO	TC 21	Equipment for fire protection and fire fighting	Standardization of equipment and vehicles for rescue and firefighting, excluding personal protective

CEN	TC/WG	Title	Scope
			equipment and that covered by CEN/TC 191.
ISO	TC 94	Personal safety -- Personal protective equipment	
ISO	TC 161	Controls and protective devices for gas and/or oil	Standardization of specifications for firefighters helmets
ISO	TC 185	Safety devices for protection against excessive pressure	The JWG shall develop test methods for testing permeation of chemicals through materials for use in protective footwear, gloves and clothing.
ISO	TC 292	Security and resilience	
CLC	TC 31	Electrical apparatus for potentially explosive atmospheres	
CLC	SR 45	Nuclear instrumentation	
CLC	TC 45B	Radiation protection instrumentation	Standardization of transportable gas cylinders, their fittings, and requirements relating to their design, testing and operation. The scope does not include LPG cylinder covered by CEN/TC 286 or non-refillable cartridges covered by CEN/TC 157. The scope does not include containers for cryogenic gases covered by CEN/TC 268.
CLC	TC 79	Alarm systems	To prepare harmonized standards for detection, alarm and monitoring systems for protection of persons and property, and for elements used in these systems. The scope includes in particular intruder and hold-up alarm systems, access control systems, periphery protection systems, combined alarm - fire alarm systems, social alarm systems, CCTV-systems, other monitoring and surveillance systems related to security applications, as well as associated and dedicated transmission and communication systems. The standards shall specify conformity tests.

C.4 React

CEN	TC/WG	Title	Scope
CEN	TC 162	Protective clothing including hand and arm protection and lifejackets	To prepare European Standards (requirements and testing) in the field of clothing to protect against physical and chemical hazards. Hand and arm protectors are included as well as high visibility clothing and clothing against drowning (e.g. lifejackets).
CEN	TC 192	Fire and Rescue Service Equipment	Standardization of equipment and vehicles for rescue and firefighting, excluding personal protective equipment and that covered by CEN/TC 191.
CEN	TC 232	Compressors, vacuum pumps and their systems	Standardization in the field of compressors and vacuum pumps, portable and stationary, for all compressible gases, and their systems. This work does not apply to sealed motor compressors used in refrigerating and heat pump systems in which the refrigerant is evaporated and condensed in a closed circuit. (Covered by CEN/TC 182)
CEN	TC 239	Rescue systems	To define standards for emergency for emergency medical vehicles and the equipment thereof as well as for first aid equipment, in the interests of providing safe and comfortable transport and preclinical treatment for patients.
CEN	TC 296	Tanks for het transport of dangerous goods	Standardization of design, construction, inspection and testing of metallic tanks intended for transport of dangerous goods of a capacity of more than 450 l. It shall cover tanks of road tankers, tanks of rail-tank-wagons and tanks intended for multimodal transport. "Tank" means the shell and all relevant equipments.

CEN	TC/WG	Title	Scope
CEN	TC 305	Potentially explosive atmospheres - Explosion prevention and protection	To develop standards where necessary in the fields of: - test methods for determining the flammability characteristics (ignition, propagation, explosion effects, etc.) of substances; - equipment and protective systems for use in potentially explosive atmospheres and equipment and systems for explosion prevention and protection.
CEN	TC 325	Crime prevention through building, facility and area design	Development of European standards for the prevention of crime at industrial facilities, educational institutions, hospitals, residential building areas, department stores, squares and public meeting places through building, facility and area design. The standards will include their area of application, the corresponding strategy, security levels, building and area layout, application of construction elements, roads and pavements. The standards may be applied to new and significantly refurbished buildings, facilities and areas. The standards will not deal with building products and security systems components.
CEN	TC 388	Perimeter Protection	Standardisation in the field of perimeter protection including systems and products (as part of the system) from the security perspective point of view, without neglecting safety aspects

CEN	TC/WG	Title	Scope
CEN	TC 391	Societal and Citizen Security	The main objective of CEN/TC 391 is to elaborate a family of European standards, standard-like documents (e.g. procedures, guidelines, best practices, minimal codes of practice and similar recommendations) in the Societal and Citizen Security sector including aspects of prevention, response, mitigation, continuity and recovery before, during and after a destabilising or disruptive event. Verification and training will also be considered. CEN/TC 391 will not deal with issues already dealt in other TCs. Concerning technology, CEN/TC 391 may identify needs in product standardisation, but this will not lead to direct action by this CEN/TC. These issues shall be communicated to those CEN, ISO or other TCs working within the framework of these specific products. Where other TCs do not address the identified areas, then CEN/TC 391 will develop the standard(s) or proposed deliverables where appropriate. The standardisation activities will consider the following main issues related to Societal and Citizen Security: - Products and services (equipment, communication, information, goods, transport, energy, cultural inheritance and properties); - Infrastructures (roads, ports, airports, rail stations, bridges, factories...); - Stakeholder needs and requirements, potential conflicts; - Relationship (cultural and geographical diversity); - Citizen requirements and vulnerabilities, including privacy.

CEN	TC/WG	Title	Scope
CEN	TC 70	Manual means of firefighting equipment	a) The design, manufacture and maintenance of portable fire extinguishers for the protection of buildings and any other possible applications; b) The design, manufacture and maintenance of mobile fire extinguishers for the protection of buildings and any other possible applications; c) The design, and manufacture of fire blankets for all possible applications; d) The design, manufacture and maintenance of all manual means for fire fighting for all possible applications with the exception of manual means used by the fire brigades which are covered by the work of TC 192 and means for fire fighting covered by TC 191.
CEN	TC 72	Fire detection and fire alarm systems	To prepare standards, harmonised where necessary to meet the essential requirement 'Safety in case of fire' of the Construction Products Directive, in the field of fire detection and fire alarm systems in and around buildings, covering test methods, requirements and recommendations for: - components; - the combination of components into systems; - the planning, design and installation of systems for use in and around buildings; - usage, maintenance and servicing; - the connections to and control of other fire protection systems; - the combination with other systems to form integrated systems; - the combination with fixed firefighting systems; - the contribution of fire detection and fire alarm systems to fire safety engineering.
ISO	TC 21	Equipment for fire protection and fire fighting	Standardization of equipment and vehicles for rescue and firefighting, excluding personal protective equipment and that covered by CEN/TC 191.
ISO	TC 92	Fire safety	
ISO	TC 94	Personal safety -- Personal protective equipment	

CEN	TC/WG	Title	Scope
ISO	TC 158	Analysis of gases	To standardize guidance on fire precautions for ventilation and air conditioning systems.
ISO	TC 161	Controls and protective devices for gas and/or oil	Standardization of specifications for firefighters helmets
ISO	TC 185	Safety devices for protection against excessive pressure	The JWG shall develop test methods for testing permeation of chemicals through materials for use in protective footwear, gloves and clothing.
ISO	TC 292	Security and resilience	
CLC	TC 31	Electrical apparatus for potentially explosive atmospheres	
CLC	SR 45	Nuclear instrumentation	
CLC	TC 45B	Radiation protection instrumentation	Standardization of transportable gas cylinders, their fittings, and requirements relating to their design, testing and operation. The scope does not include LPG cylinder covered by CEN/TC 286 or non-refillable cartridges covered by CEN/TC 157. The scope does not include containers for cryogenic gases covered by CEN/TC 268.
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CLC	TC 216	Gas detectors	

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