ProSPeReS

ANALYSIS AND ASSESSMENT

OF THE RELEVANCE OF THE STATE-OF-THE-ART ACHIEVEMENTS IN PUBLIC PLACES PROTECTION
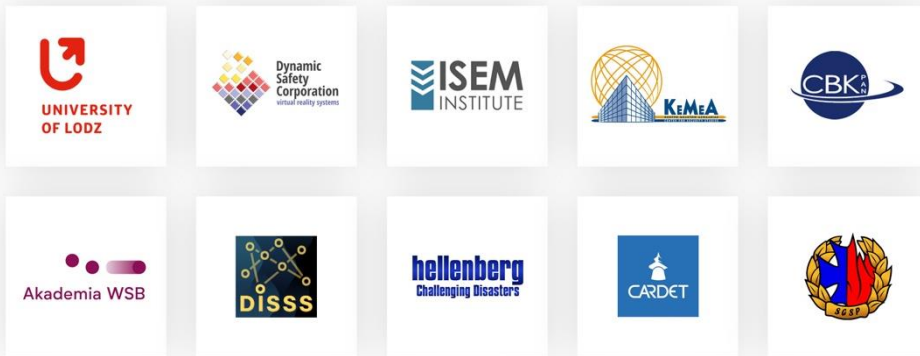
The ProSPeReS Consortium

Security experts, security research and academic institutions, providers of technical solutions and services

Law enforcement agencies (LEAs)

Faith-based organizations

D3.1 – Analysis, and assessment of the relevance of the state-of-the-art achievements in public places protection

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Definitions, Acronyms and Abbreviations

Acronyms / Abbreviations	Description
BWA	Blade Weapon Attack
CBRN-E	Chemical, Biological, Radiological, Nuclear, Explosive (substances and agents)
CCTV	Close Circuit Television
COMECE	Commission of the Bishops' Conferences of the European Union
DG HOME	Directorate- General for Migration and Home Affairs
EC	European Commission
EU	European Union
FAA	Firearms Attack
GTI	Global Terrorism Index
IED	Improvised Explosive Device
ISFP	Internal Security Fund- Police
LEA	Law Enforcement Agency
PBIED	Person- Borne Improvised Explosive Device
ProSPeReS	Protection System for large gatherings of People in Religious Sites
PSOI	Public Space of Interest
UAV	Unmanned Aerial Vehicle
UAVIED	Unmanned Aerial Vehicle (borne) Improvised Explosive Device
VA	Vulnerability Assessment
VAC	Vulnerability Assessment Checklist
VAT	Vulnerability Assessment Tool
VBIED	Vehicle- Borne Improvised Explosive Device
VWA	Vehicle Weapon Attack
WP	Work Package
WTMD	Walkthrough Metal Detector
BWA	Blade Weapon Attack

Executive summary

Deliverable 3.1 will focus on the first part of WP3 of the ProSPeReS project and will analyse and assess the relevance of the state-of-the-art achievements in public places protection, security by design, novel detection technology, equipment, PPE, procedures and training and cooperation protocols.

The so called state-of-the-art that has been described in this document, refers to relevant standards, science and technologies with regards to the protection of public spaces. By first defining what it means to protect public spaces pre, during and after a terrorist threat, this deliverable aims at creating a clear picture and raising awareness concerning what is needed to help local authorities and other important stakeholders within the protection of public spaces to help better protect their public spaces against terrorist threats. Many achievements have been made within the field of public spaces protection. This document will provide an overview of these achievements and assess and analyse their relevance to the protection of public space.

1. Introduction

In comparison to other public spaces, religious sites are considered especially vulnerable to attacks due to their accessibility and the limited presence of security measures. In recent years, many religious sites of different faiths have been targeted by extremists. Feedback collected from religious institutions and authorities suggests that there is a growing concern about their protection and the balance that should be kept between the security and the preservation of the open nature of religious sites.

According to Europol's TESAT Report (2022)[1], terrorism remains a key threat to the EU's internal security. The report describes that in 2021, a number of 15 completed, foiled and failed terrorist attacks was recorded in the EU. The fact still remains that lone actors are considered the primary perpetrators of terrorist and violent extremist attacks in Europe. Furthermore, the TE-SAT 2022 report describes that in 2021, the attacks that have been carried out by individuals who have been associated mainly with jihadist and right-wing terrorism and violent extremism. However, lone actors carrying out terrorist attacks does not mean that the attackers act in complete isolation. A key role in the radicalisation process of an individual nowadays plays the building of and membership in online communities sharing the same radicalized thoughts and ideologies and connecting peers who inspire one another virtually on a global scale.

In addition, to fully understand terroristic threats, it is highly important to understand current trends in society. Our bias against 'the other', the so-called us-them antagonism, prevents us from seeing the immediate danger around us. Extremism is expressed through various activities and not necessarily as planned direct attacks against a designated public space. For instance, violent anti-COVID-19 and anti-government extremism, which is not affiliated with traditional violent extremist and terrorist activities emerged in some Member States and non-EU countries. Within the Netherlands, many politicians were threatened by anti-COVID-19 extremists, which escalated to violent actions against the Dutch National Police and raids in small cities[2]. These types of forms of violent extremism can be materialised into open threats, hateful messages spread online and, in some cases, by the use of violence (as was the case in the Netherlands) in public areas, affecting the local communities. In France, for example, the Criminal Court of Paris heard the case of six French nationals that had been accused of participating in a terrorist conspiracy and for two of them, theft in the context of a terrorist offence. The main defendant had also been charged with *'public glorification of an act of terrorism using an online communication service*[3]*'*. Somewhere between 2016 and 2017, these defendants had then set up a right-wing terrorist organisation that was named the *Organisation des Armées Sociales* that aimed at fighting the 'islamisation of France[4]'.

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[1] Europol (2022). *Terrorism Situation and Trend Report. European Union (TE-SAT)*. Pp 4-7. Retrieved on June 22nd 2022, URL: https://www.europol.europa.eu/cms/sites/default/files/documents/Tesat_Report_2022_0.pdf

[2] Nationaal Coördinator Terrorismebestrijding en Veiligheid (2022). *Anti-overheidsextremisme.* Retrieved on August 31st 2022. URL: https://www.nctv.nl/onderwerpen/dtn/actueel-dreigingsniveau/anti-overheidsextremisme

[3] Europol (2022). *Terrorism Situation and Trend Report. European Union (TE-SAT)*. Pp 51. Retrieved on June 22nd 2022, URL: https://www.europol.europa.eu/cms/sites/default/files/documents/Tesat_Report_2022_0.pdf

[4] Regarding the legal qualification of the OAS as a terrorist organisation, the court underlined the clear historical reference to the French far-right paramilitary organisation set up during the Algerian War, the Organisation Armée Secrète (OAS, 'Secret Armed Organisation'), which had been held accountable for assassinations, bombings and terrorist attacks. In addition to its ideological proximity, the organisation founded by the defendants adopted structural elements of the OAS set up in 1961, functioning as a military-like and clandestine structure. Europol (2022). *Terrorism Situation and Trend Report. European Union (TE-SAT)*. Pp 51. Retrieved on June 22nd 2022, URL: https://www.europol.europa.eu/cms/sites/default/files/documents/Tesat_Report_2022_0.pdf

They planned violent actions that were targeted against individuals and groups of people based on **ethnical and religious criteria**, as well as well-known figures such as politicians, or busy locations such as restaurants **and places of worship**, while the latter are becoming a more vulnerable group for possible attacks.

Considering the above, in order to effectively tackle modern challenges related to the protection of public spaces and religious sites, contemporary solutions are required, extending beyond traditional technical security measures. PRoSPeReS addresses that issue by forming an outstanding cooperation of scientists, security experts and practitioners, public services and religious institutions (representing Catholic Church, Greek Orthodox Church and the Jewish Community) towards a comprehensive protection system. The project covers measures for increasing the prevention, protection, deterrence and response to various types of terrorist threats and incidents that may occur in religious places, including attacks with CBRN agents.

The measures will consist of a set of tailor-made templates, tools, procedures, equipment, improvements in infrastructure according to "security by design" and protocols of cooperation with public services. The implementation of the system will be enhanced by preparing and initiating modular training including e-Learning with VR, applicable in various types of education in religious structures; conducting large-scale exercises; and conducting EU-wide awareness-raising campaign aimed at faith-based leaders, worshipers and public in general. The significant impact of the project at a European level appears achievable due to the fact of consulting the project idea with influential religious organizations and involving them in the consortium as well as receiving very positive feedback from international religious structures, which confirmed the relevance of the project and interest to support the introduction of the system in all EU Member States.

Provided the above, this deliverable aims to present the state-of-the-art achievements in public places protection, such as relevant standards or useful methods that can be used within the part of identifying and analysing threat types and standards for crowd and crisis management, scientific theories that can explain the emerging of radicalized behaviour and state-of-the-art technologies that can help to better protect public spaces pre, during and after a terrorist threat such as smart devices and other relevant novel technologies or preventative and damage control measures. In deliverable 3.2 this will be used as a basis to see how these achievements can be translated into solutions for increasing the protection of places of worship.

1.1 Background

The categories of public spaces mentioned in ProSPeReS Deliverable 2.1, such as cultural and business venues, shopping malls, transport hubs, entertainment venues and places of worship in the EU, have become targeted by offenders with terrorist motives. These kinds of public spaces can be especially vulnerable due to their crowd density, their accessibility and open character. To support its Member States to better protect their citizens and public spaces against terrorist threats, the EU has adopted several measures in order to facilitate the network and community building between EU Member States, to encourage cross-border and public-private cooperation, to organise joint trainings and to promote closer coordination. A very clear overview on the effect(iveness) of these measures has been provided by the European Council[5]. In this context, the Commission also funds projects that have EU added value and aim to increase the protection of public spaces. The **EU Counter-Terrorism**

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[5] European Council (2022). The EU's work to tackle terrorism. Retrieved on August 31st 2022. URL:
https://www.consilium.europa.eu/en/eu-response-to-terrorism/

Agenda[6] adopted in 2020 builds on existing policies and puts forward initiatives to ensure physical protection of public spaces, places of worship, and critical infrastructure. In addition, it builds on the **EU Action Plan** to support the protection of public spaces[7], which was adopted in 2017. The recently adopted **Council Conclusions on the Protection of Public Spaces**[8], approved by the Council (Justice and Home Affairs) on 7 June 2021, acknowledge that public spaces demand adequate protection and encourage the Commission "to continue the efforts undertaken in launching and funding initiatives, such as the EU Forum for the Protection of Public Spaces, training programmes and projects under the Internal Security Fund and Horizon Europe". Moreover, the new **EU strategy on combating anti-semitism and fostering Jewish life**[9] (2021-2030) of 5 October 2021 entails a dedicated chapter on Protecting Jewish life in the EU and underlines the need to strengthen the protection of places of worship. The Commission services, in cooperation with the police units of the EU High Risk Security Network, have also elaborated in 2020/21 an **EU Quick Guide to support the protection of places of worship**[10]. This Guide assists places of worship to assess their vulnerability and strengthen their preparedness while maintaining their sacred nature. This includes defending against random acts of violence for lower risk places and improving awareness and resilience against a number of threats such as vehicles, firearms, explosive and bladed weapons. As of 1 February 2021, **Regulation (EU) 2019/1148 on the marketing and use of explosives precursors**[11] applies, repealing and strengthening the previous Regulation (EU) No 98/2013 on explosives precursors, while laying down restrictions and reporting obligations for certain chemicals that can be misused to build bombs. In respect to CBRN, the policy framework is provided by **the 2017 Action Plan to enhance preparedness against chemical, biological, radiological and nuclear security risks**[12]. It focuses on the security issues, but it is at the same time a platform for all actors involved in the CBRN policy. The Action Plan has four objectives (1) Reducing the accessibility of CBRN materials, (2) Ensuring a more robust preparedness for and response to CBRN security incidents, (3) Building stronger internal-external links in CBRN security with key regional and international EU partners, and (4) Enhancing our knowledge of CBRN risks. The document underlines the need for enhanced cross-border and cross-sectoral cooperation.

ProSPeReS aims directly at implementation of the EU Action Plan to support the protection of public spaces and the EC STAFF WORKING DOCUMENT "Good practices to support the protection of public spaces" in the specific context of places of worship[13].

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[6] European Commission (2020). *A CounterTerrorism Agenda for the EU: Anticipate, Prevent, Protect, Respond.* Strasbourg: Communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions. Retrieved on July 22nd 2022. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52020DC0795

[7] European Commission (2017). *Action Plan to support the protection of public spaces.* Strasbourg: Communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions. Retrieved on July 22nd 2022. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52017DC0612

[8] Council of the European Union (2021). *Council Conclusions on the Protection of Public Spaces.* Retrieved on July 22nd 2022. URL: https://data.consilium.europa.eu/doc/document/ST-9545-2021-INIT/en/pdf

[9] European Commission (2021). *EU Strategy on Combating Antisemitism and Fostering Jewish Life.* Strasbourg: Communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions. Retrieved on July 22nd 2022. URL: https://ec.europa.eu/info/sites/default/files/eu-strategy-on-combating-antisemitism-and-fostering-jewish-life_october2021_en.pdf

[10] European Commission (2021). EU Quick Guide to support the protection of Places of Worship. Retrieved on July 22nd 2022. URL: https://home-affairs.ec.europa.eu/document/download/8a4ef2e6-12ff-446d-9df5-1ce164adab25_en?filename=EU%20Quick%20Guide%20to%20support%20protection%20of%20Places%20of%20Worship_en.pdf

[11] EUR-Lex (2019). Regulation (EU) 2019/1148 of the European Parliament and of the Council of 20 June 2019 on the marketing and use of explosives precursors, amending Regulation (EC) No 1907/2006 and repealing Regulation (EU) No 98/2013 (Text with EEA relevance). Retrieved on July 22nd 2022. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32019R1148

[12] European Commission (2017). *Action Plan to enhance preparedness against chemical, biological, radiological and nuclear security risks.* Strasbourg: Communication from the commission to the european parliament, the council, the european economic and social committee and the committee of the regions. Retrieved on July 22nd 2022. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52017DC0610&from=EN

[13] ProSPeReS GA, page 94-95.

Activities of ProSPeReS address the following priorities[14]:

1. Enhance the protection of places of worship

2. Develop and implement the good practices listed in the Commission Staff Working Document "Good practices to support the protection of public spaces" in the areas of vulnerability assessments training and planning, risk awareness, physical protection and coordination and cooperation between public and private stakeholders.

The general objective of ProSPeReS is to leverage the security of places of worship in the EU against terrorist attacks. This can be achieved by forming a cooperation between faith-based leaders, public services and security experts, carrying out vulnerability assessments, raising public risk awareness (especially key beneficiaries – clergy and worshippers), as well as developing and validating a comprehensive protection system.

The framework of the ProSPeReS project is in line with the priorities of the EU and the project participant Countries (Poland, Slovakia, Greece, Netherlands, Finland and Cyprus).

WP3 objectives and activities

Work Package 3 in its entirety will focus on preparing the tailor-made security measures for religious sites. The aim of this WP is to prepare the comprehensive set of security measures in accordance with the findings of WP2.

1.2 Reading guide

This deliverable 3.1 will focus on the first part of this WP3 and will analyse and assess the relevance of the state-of-the-art achievements in public places protection, security by design, novel detection technology, equipment, PPE, procedures and training and cooperation protocols.

The so called state-of-the-art describes the capabilities with regards to standards, science and technologies regarding the protection of public spaces. By first defining what it means to protect public spaces pre, during and after a terrorist threat, this deliverable aims at creating a clear picture and awareness with regards to what is needed to help local authorities and other important stakeholders within the protection of public spaces to help better protect them against terrorist threats. Many achievements have been made within the field of public spaces protection. Within this deliverable, these state-of-the-art achievements will be analysed and assessed in three chapters (see Figure 1).

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[14] European Commission (2020). *Internal Security Fund – Police: Call for Proposals: Ref. Ares(2020)3181661 - 18/06/2020*. Retrieved on May 22nd 2022, URL: https://ec.europa.eu/research/participants/data/ref/other_eu_prog/home/wp/call-fiche_isfp-2020-ag-protect_en.pdf , p3-4
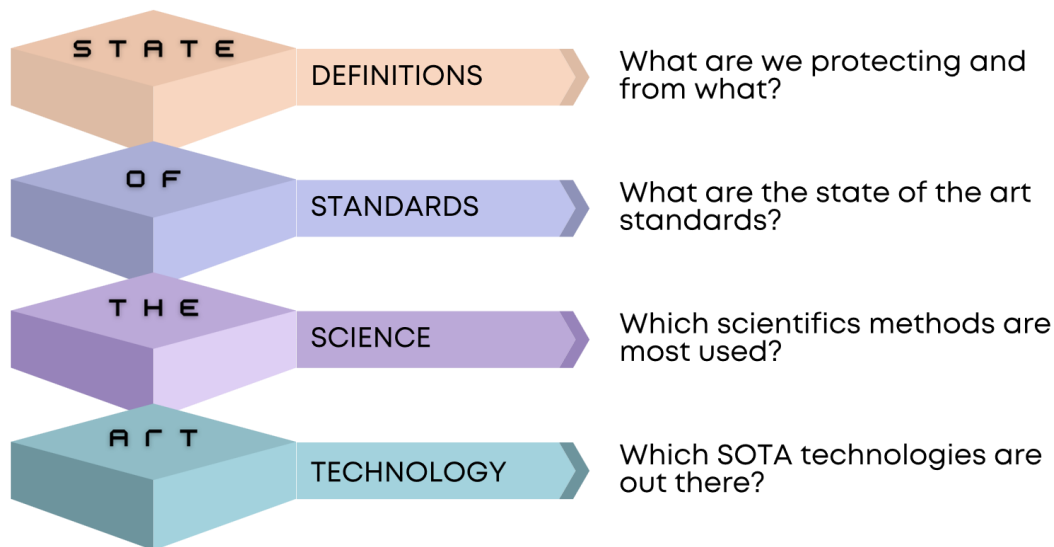
STATE	DEFINITIONS	What are we protecting and from what?
OF	STANDARDS	What are the state of the art standards?
THE	SCIENCE	Which scientifics methods are most used?
ART	TECHNOLOGY	Which SOTA technologies are out there?

Figure 1. Reading guide into deliverable 3.1 State-of-the-art in public spaces protection.

Chapter 1 provides an introduction into this *"Analysis and assessment of relevance of the state-of-the-art achievements in public places protection"* deliverable.

Chapter 2 in three parts will analyse the current state-of-the-art in the protection of public spaces. Those three parts are 1) standards, 2) science and 3) technologies.

>   **Paragraph 2.1**: Standards, will explain which standards are known to prevent terrorist attacks in public spaces of interest thus far.
>   **Paragraph 2.2:** Science, will describe which different social and criminologically relevant scientific theories exist, that can help to prevent threats to public space.
>   **Paragraph 2.3:** Technologies. The state-of-the-art (technologically advanced) security measures will be defined in consideration of the recent and most efficient solutions available in the field of soft places protection.

Chapter 3 will conclude the deliverable and discuss the most important results of the analysis and assessment of relevance of the state-of-the-art achievements in public places protection.

1.3 Protecting Places of worship

The freedom of thought, conscience and religion is a fundamental human right tenaciously protected in the EU by legal instruments at the level of international, European and individual member state law. Attacks on people exercising their fundamental right to freedom of thought, conscience and religion in churches, mosques, synagogues and other places of worship continue to occur with dreadful consistency across Europe. Nice, Paris, Hanau, Bayonne, Copenhagen, Baerum, Rouen and Halle are the most recent additions to the increasing list of terrorist attacks on places of worship. Anticipating, preventing, protecting and responding to malicious acts of religious intolerance and violent radicalization requires multi-disciplinary and multi-stakeholder efforts, which affect and are affected by

the whole of society[15].

The term "**place of worship**" refers to any temple, shrine, site, faith community centre or religious school where worship of any religion is practiced. The basic principles to follow when designing tailor-made protection solutions for a particular place of worship are similar to techniques employed for other public spaces/soft targets, namely: threat identification and assessment, vulnerability assessment, likelihood/consequences evaluation, selection of counter/mitigation measures as well as rehearsal and review of security planning[16].

To understand the importance of Vulnerability Assessment in relation to places of worship, it is crucial to understand terrorist activity and relevant risks in general.

According to worldwide Global Terrorist Index (GTI) 2020[17], there have been several distinct phases of terrorist activity over the past two decades. Europe recorded 2,558 deaths from 4.531 terrorist attacks between 2002 and 2019[18]. In addition, between 2002 and 2010 UK and France were the second and third most affected countries in Europe, however they both saw a decrease in attacks between 2018-2019. The majority of the attacks in 2019 occurred in Northern Ireland, where 69 incidents were recorded (p.46). The main type of attacks by region, indicate that bombings and armed assaults are the most common forms of terrorism in most regions. Most specifically, in Europe 50% of the attacks are Bombing/Explosion, 15% armed-assault, 5% hostage tacking and 5% assassination, 20% facility /infrastructure attack and 5% have other forms (p.44).

Places of worship are considered "soft targets" and highly vulnerable due to their unrestricted, unguarded, and free access. They are a symbol of high religious, cultural, architectural, and historic value, the disruption of which constitutes a disruption to society from a wider perspective.

According to the JRC report[19], which gives a very concrete and insightful overview on the protection of public spaces, the term "soft targets" is typically adopted to indicate vulnerable places (lack of protective measures) that may be selected by terrorists in their effort to maximize casualties, thus inflicting fear on the population and attaining media coverage. The methodology of the attackers has shifted during the last years by placing the citizens as their main target instead of hardened structures, which would require better planning, larger support and funds, and where the chances of success could be lower[20].

Terrorist attacks and especially the ones targeting "soft targets" aim to disrupt the society's functions and create instability in addition to inflicting damage and causing casualties among the general population. The impact on urban centres, including locations of soft targets, is increasing. Small-scale attacks are encouraged by violent extremist groups that result in establishing conflict grounds within cities protected territories and creating insecurity and destabilization. Soft spaces, such as faith locations, are turning into attack targets.

As stated to the EU Quick Guide[21] to support the protection of Places of Worship, **places of worship of all faiths are recognised as holding particularly high symbolic value and have been frequently**

[15] European Commission (2020). *Protection of Places of Worship*. Retrieved on May 22nd, 2022, URL: https://ec.europa.eu/newsroom/pps/items/696367

[16] European Commission. *Protection of Public Spaces Newsletter* (22 April 2020): "Terrorism Risk Assessment of Public Spaces for Practitioners" https://ec.europa.eu/newsroom/pps/item-detail.cfm?item_id=674909&utm_source=pps_newsroom&utm_medium=Website&utm_campaign=pps&utm_content=Terrorism%

[17] Institute for Economics and Peace (2020). *Global Terrorist Index.* Retrieved on May 22nd 2022, URL: https://www.visionofhumanity.org/wp-content/uploads/2020/11/GTI-2020-web-2.pdf

[18] Institute for Economics and Peace (2020). *Global Terrorist Index.* P.9. Retrieved on May 22nd 2022, URL: https://www.visionofhumanity.org/wp-content/uploads/2020/11/GTI-2020-web-2.pdf

[19] Joint Research Centre Science Hub (2021). A guide to key information on the protection of public spaces. Retrieved on August 31st 2022. URL: https://publications.jrc.ec.europa.eu/repository/handle/JRC125541

[20] Institute for Economics & Peace, Global Terrorism Index (2020). *Measuring the Impact of Terrorism*. p.46. Retrieved on May 22nd 2022, URL: https://www.visionofhumanity.org/wp-content/uploads/2020/11/GTI-2020-web-1.pdf

[21] European Commission (2021). EU Quick Guide to support the protection of Places of Worship. Retrieved on July 22nd 2022. URL: https://home-affairs.ec.europa.eu/document/download/8a4ef2e6-12ff-446d-9df5-1ce164adab25_en?filename=EU%20Quick%20Guide%20to%20support%20protection%20of%20Places%20of%20Worship_en.pdf

targeted by terrorists. Therefore, the Commission services consider it a priority to strengthen their protection by fostering cooperation between the different faith communities and with relevant national authorities, and by supporting projects that enhance their physical protection. The start will be this document to summarize the basis on which Deliverable 3.2 Preparing security by design guidebook for religious sites can focus.

2. State-of-the-art
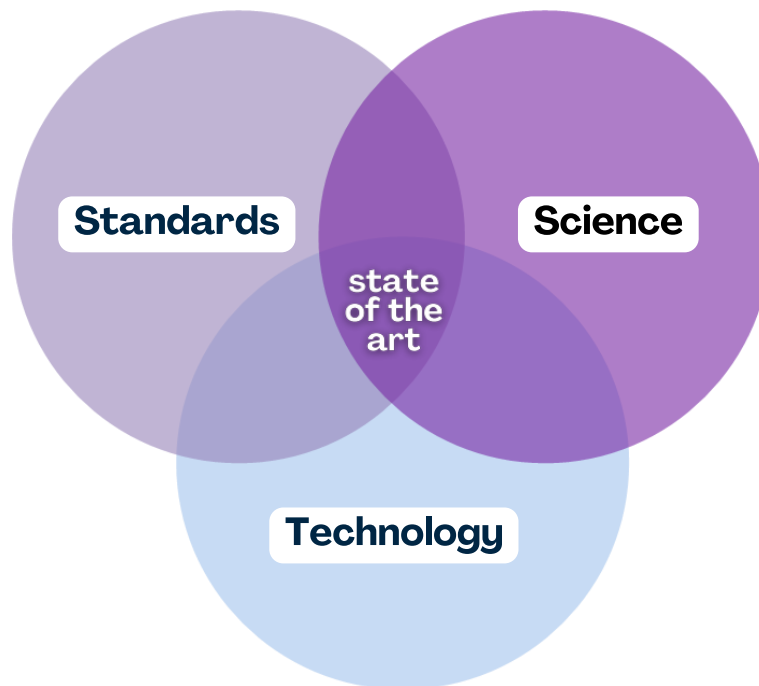
Figure 2. State-of-the-art.

Within the following chapter, the state-of-the-art of the protection of public spaces with regards to available standards, scientific theories and methods (see Figure 2) and (innovative) technologies will be described. This deliverable also assesses their relevance to religious sites and prepares recommendations for infrastructure improvements, security procedures for terrorist attacks and other security incidents, as well as equipment and models of cooperation and communication with public services, based on the current state-of-the-art in the protection of public spaces.

2.1 State-of-the-art: Standards

In this chapter standards like the ISO Risk Management Guidelines 31000:2018, ISO Guidelines for crime prevention through environmental design (CPTED) 22341: 2021, The Purple Guide as a well-known guide that describes the standards and methods revolved around event management, will be explained and legal frameworks will be discussed within this chapter. But it will also describe methods that can help to better protect public spaces that are not official standards, but can be very helpful, such as the EU VAT.

2.1.1 State-of-the-art methods for public spaces protection: EU VAT

Based on identified good practices, assessing and planning based on informed decisions is very important for operators and public authorities that wish to take further steps to protect public spaces. In its effort to enhance the protection of public spaces, the European Union's Directorate General for Migration and Home Affaires (DG HOME) has developed the EU Vulnerability Assessment Tool (VAT)[22] (DG HOME, 2019) which main objective is to provide practical support to Member States to enhance the protection of public spaces by facilitating the implementation of an on-site vulnerability assessment[23]. The EU VAT is not an official standard, which has been agreed upon by international experts and for instance has been adopted by the International Organization for Standardization (ISO). However, within several EU projects, such as Secu4All[24], PRoTECT[25] and now also the ProSPeReS project (which has even made a documentary[26][27] to inform local authorities and municipalities on the importance of assessing vulnerabilities in public spaces), the EU VAT has been used to educate those that are involved in the protection of public space on how to conduct a vulnerability assessment. The EU VAT might not be an official standard and it is still being altered and in the process of development, but it is a tool that is being used within the context of raising awareness and training important stakeholders. Recently, the EU VAT has been updated into a new version (which is not yet available to the public), the EU Vulnerability Assessment Checklist[28].

To help explain the goal, aim and usage of the EU VAT, the PRoSPeReS Deliverable 2.1 has created a "Manual for Vulnerability Assessment". The process of conducting a vulnerability assessment using the EU VAT, has been described in D2.1 elaborately. It provides a step-to-step guidance towards assessing any place of worship regarding threats and vulnerabilities. By conducting a **vulnerability assessment**, the managing body (for instance the leader of the religious organisation) helps himself in defining, identifying, classifying, and prioritizing vulnerabilities to possible attacks, which stem from several factors such as a high concentration of people during a mass or any other type of event, combined with a lack of security measures. Vulnerability assessments also provide the organisation doing the assessment with the necessary knowledge, awareness and risk backgrounds to understand and react to threats. A comprehensive vulnerability assessment, along with a management program, of which the state-of-the-art processes will be described in this deliverable, can help stakeholders improve the protection of their spaces[29]. Also, by adopting focused and justified security measures and policies, they will be able to make informed decisions. The identification of vulnerabilities should be based on current security measures and the Public Space of Interest's (PSOI) - in this case the Place of Worship's - effectiveness to mitigate or manage potential threats[30]. The process of vulnerability assessment combines two steps of a larger type of assessment, which is **Risk Assessment**.

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[22] Not publicly available at the time of this manual's conduction.

[23] German Prevention Congress (2021). *Manual for vulnerability assessment of public spaces*. Retrieved on May 22nd 2022, URL: https://www.praeventionstag.de/nano.cms/daily-prevention-news/details/5381

[24] European Forum for Urban Security (zj). Secu4All. Retrieved on August 11th, 2022. URL: https://efus.eu/secu4all-en/

[25] PRoSPeReS Project (2021). Deliverable 2.1 – Manual for Vulnerability Assessment. Retrieved on August 11th, 2022. URL: https://protect-cities.eu/wp-content/uploads/2021/02/PRoTECT_Deliverable-2.1-Manual-EU-VAT_v2.0.pdf

[26] PRoSPeReS Project (2022). PRoTECT documentary. Retrieved on August 11th, 2022. URL: https://www.youtube.com/watch?v=2IkiIuaMYAU

[27] PRoSPeReS Project (2022). PRoTECT documentary trailer. Retrieved on August 11th, 2022. URL: https://www.youtube.com/watch?v=2IkiIuaMYAU

[28] PRoSPeReS Project (2021). PRoTECT documentary trailer. URL: https://protect-cities.eu/wp-content/uploads/2021/02/EU-VAC-Content-2021_DG-Home.pdf

[29] TechTarget (2022). *Definition: vulnerability assessment (vulnerability analysis).* Retrieved on May 22nd 2022, URL: https://searchsecurity.techtarget.com/definition/vulnerability-assessment-vulnerability-analysis

[30] PRoSPeReS Project (2022). *Deliverable 2.1 – Manual for Vulnerability Assessment, p.19.*

2.1.2   Standard for public spaces protection: ISO Risk Management Guidelines 31000:2018

Risk Assessment[31] is the overall process of risk identification, risk analysis and risk evaluation Managing the risks to public space, or in this specific case, the risks to a place of worship, should always be done in a continuous manner. Risks can increase, decrease or change in other ways over time and space. The International Organization for Standardization (ISO) has provided standardized guidelines for risk management in general. ISO 31000 (2018) defines it as: "coordinated activities to direct and control an organization with regard to risks*".* Also, in security (risk management), these activities are directed towards mitigating the negative effects that intentional or unwarranted actions could have against an organization asset, whether these refer to structures, people, information, or others[32]. Before any organization decides to dive deep into risk assessment, it is advised to consult these official guidelines.

This report will only focus on concrete methods and measures that can help with the protection of places of worship during large gatherings, with the emphasis on large gatherings. To conduct a risk assessment (which is especially important if an organization expects a large gathering with high crowd density), you need to identify the risks in three steps. The final additional step is to then start treating the risks (by using innovative technologies and or other types of risk treatment).

Figure 3. Risk assessment process.

Risk identification

Identifying the risks to public space can be done in many ways. An important term in the process of identifying risks is **risk factors**. Risk factors are factors that can increase the probability of an attack. These factors can be divided into many types, but to keep it simple and concrete, we will divide them into:

- **environmental risk factors** (concerning the physical and social environment of the public space)
- **individual risk factors** (concerning the perpetrator).

Risk factors that are related to the **physical environment** of a public space may refer to a site's physical characteristics, including its layout, design, physical structures, technical components, equipment and

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[31] International Organization for Standardization (2018). ISO 31000:2018 – Risk management - Guidelines. p.11. Retrieved on August 11th, 2022. URL: https://www.iso.org/standard/65694.html

[32] Talbot, J. & Jakeman, M. (2009). *Security Risk Management: Body of Knowledge*. Pp 1-14. New Jersey: John Wiley & Sons, Inc.

security measures in place. These can affect the capability of the competent staff or authorities for threat detection, prevention and response in case of attacks. At the same time, they may generate opportunities for perpetrators to carry out an attack, thus increasing the probability of a site to be selected as a potential target. Indicatively such physical characteristic may include but not be limited to:

➢ Insufficient lighting that hinders the surveillance of the site and provides hiding spots

➢ Secluded areas or walkways that are not monitored and attacks against individuals can take place

➢ Complex structures that obstruct surveillance and hinder evacuation efforts

➢ Narrow pathways that can lead to crowd congestion during evacuations

➢ Wide open spaces lacking a secure perimeter or other structures (bollards, street furniture etc.) to prevent attacks with vehicles

➢ Inadequately secured critical areas or restricted access areas that grant open access of visitors.

➢ Lack of alarm systems

➢ Unattended or inadequately secured technical components such as electrical distribution boards that can be used to cut the power at a site or litter bins that can be used to place explosive devices

➢ Inadequate protection of valuable items

The location of a public space or facility in general in general can also affect the overall risk of attacks. A public space may be located near high-risk buildings (e.g., an embassy) or other public spaces (e.g. a metro station) that can affect the probability of attacks occurring.

Examples of **social environmental risk factors** are social processes that take place in the direct environment of a public space or as an example close to a religious place, such as high tensions between two religious or ideological groups, or long-term social problems such as social disorganization. When individuals in society form groups that focus on just one ideology or religion, segregation can occur. Groups then drift apart from each other and in some severe cases can start to dehumanize those that do not share the same ideology or religion. These processes of segregation, or social disorganization, are examples of a multitude of possible environmental risk factors that can increase the risk of a threat aiming at a place of worship. Due to the fact that religious places also carry an extra element of risk, being their *symbolical value*, it is highly important to consider these types of environmental risk factors. In the Netherlands for instance, we see that the risks to places of worship do not only come from the 'usual suspects', but that riots can occur when other religious or ideologically motived groups want to provoke during religious events. A concrete example happened at the Al Fourqaan Mosque in 2019, when the right-wing extremist group Pegida wanted to host a pork meat barbecue next to the mosque during Ramadan, to provoke the practising Muslims by spreading pork meat scent[33]. A counter reaction came from young Muslims, wanting to defend their faith. However, this reaction escalated completely and local special police forces were attacked. Both parties (police and the religious leader of the Al-Fourqaan Mosque) wanted to address that violence is never the answer. Those suspected of attacking the police have been trialled in court. But the right-wing members of Pegida, on that day, decided to cancel their protest. Ever since, Pegida tries to organize pork meat

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[33] Omroep Brabant (2019). 'Pegida wil demonstratief BBQ'en bij de moskee in Eindhoven, maar dat mag niet. Retrieved on April 4th, 2022. URL: https://www.omroepbrabant.nl/nieuws/2991376/pegida-wil-demonstratief-bbqen-bij-de-moskee-in-eindhoven-maar-dat-mag-niet

barbecues near mosques and their protests need to be prohibited by the municipalities each time[34][35]. They are now in court fighting the decision of Eindhoven's mayor regarding the banning of their barbecue protest in 2019[36]. This example shows how important it is to not only look at 'the obvious' threat types, but also to look at social processes (**environmental risk factors**) in the direct environment of a place of worship.
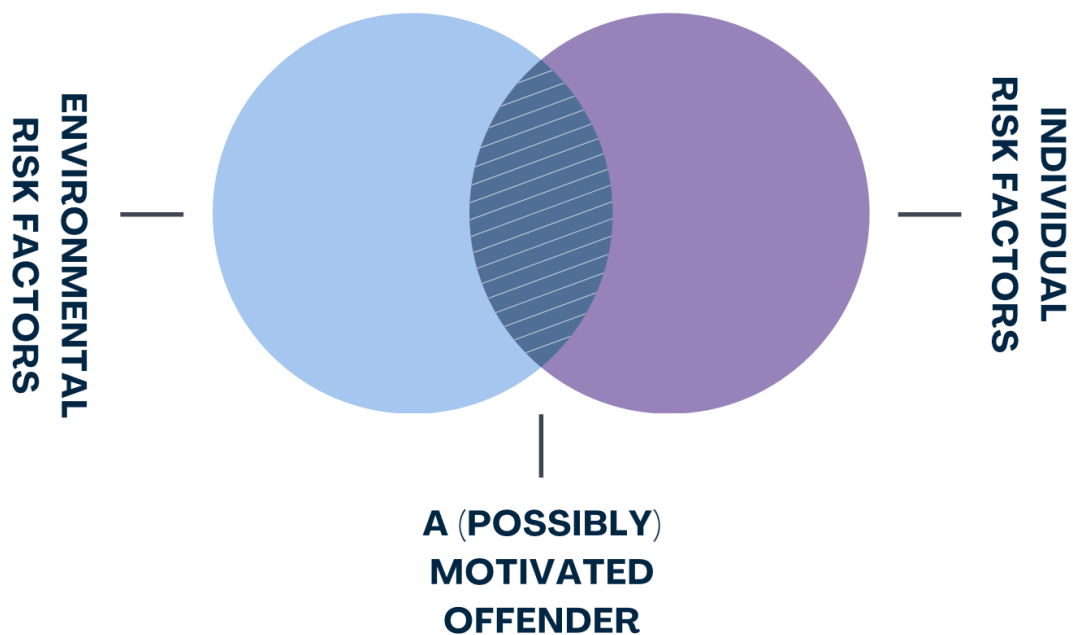
Figure 4. Risk factors.

Risk factors can be formed by the physical and social environment in which crime occurs, but they can also arise at the level of an individual. **Individual risk factors** entail the internal processes that take place in the radicalization of an individual. Risks to the public safety of places of worship can also come from radicalized individuals. Within our European borders, we have also seen severe attacks by **lone actor terrorists.** When an individual starts to dive very deep into the 'us against them' type of thinking, radicalisation processes can start occurring. Especially when this type of antagonism arises (considering society as 'us against them'), the other in their mind can be considered as the enemy. In the case of religion, when an individual is not able to separate the individual beings from the religious ideology, they then deindividualize human beings and see them as a representation of that religion.

[34] Eindhovens Dagblad (2022). Verboden barbecue bij Eindhovense moskee laat Pegida niet los. Retrieved on April 4th, 2022. URL: https://www.ed.nl/eindhoven/verboden-barbecue-bij-eindhovense-moskee-laat-pegida-niet-los~a9f05f43/?referrer=https%3A%2F%2Fwww.google.de%2F

[35] Schiedam Online (2022). Geen toestemming voor 'provocerende barbecue' Pegida bij Schiedamse moskee. Retrieved on April 4th, 2022. URL: https://schie.nu/nieuws/13446/geen-toestemming-voor-provocerende-barbecue-pegida-bij-schiedamse-moskee

[36] NOS (2018). Rechter verbiedt barbecue Pegida bij Utrechtse moskee. URL:https://nos.nl/artikel/2235023-rechter-verbiedt-barbecue-pegida-bij-utrechtse-moskee

Anders Breivik, who bombed, shot and killed 77 victims[37], was a radicalized right-wing extremist, who posted his manifesto online before his attack. He embodied the 'us against them' antagonism, as he wanted to 'protect Norway from Islamisation'. He never apologized for the attacks and in his own words considered them "*atrocious, but necessary*"[38]. There have been many more atrocious attacks by lone actors. Although lone actors consider themselves to be very different from 'the other', lone actors of ALL religions and ideologies are often influenced by the same risk factors. These **individual risk factors** are often factors such as **lack of social competence**, **narcissistic personality disorder**, **suicidal intent** and others. But not every individual with extremist views and certain personality traits will act on these views. The EU Commission's Radicalisation Awareness Network (RAN) describes in its report on lone actors that assessing the risk of a lone actor preparing for an attack, requires the identification of **the presence or absence of threshold behaviours** that mark the position they are on the 'lone actor pathway' to an attack[39]. Sharing this information, according to the EU Commission RAN, enables patterns of behaviours to be identified.

Figure 5. Lone actor pathway

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[37] BBC (2022). Norway mass killer Anders Breivik ordered to stay in jail. Retrieved on April 11th, 2022. URL: https://www.bbc.com/news/world-europe-60219876

[38] BBC (2012). Profile: Anders Breivik. Retrieved on April 11th, 2022. URL: https://www.bbc.com/news/world-europe-14259989

[39] European Union (2021). *Lone Actors as a Challenge for P/CVE*. Retrieved on April 11th, 2022. URL: https://ec.europa.eu/home-affairs/system/files/2021-10/ran_lone_actors_as_challenge_for_pcve_july_2021_en.pdf

One of the important goals within the ProSPeReS project is to create awareness and share knowledge with and for religious organisations to better protect places of worship against terrorist attacks. This deliverable will go into a very important pattern in the behaviour of lone actor terrorists. Their process of radicalisation is very similar and should be treated as such. In general, the thought process among lone actors is quite similar, and their different ideological or religious motives do not change their behaviour. However, their modus operandi can be different from each other. Despite that, what remains important is that in the preventative phase of protecting a public space against any type of terrorist threat, it should be kept in mind that the process of radicalisation is complex, but similar for all types of lone actors (right-wing, left-wing, ethno-separatist or jihadist etc.). By understanding the environmental and individual risk factors including the patterns in behaviours, leaders of religious organisations can increase the chances of suspicious behaviour being identified at an early stage. The Europol TE-SAT[40] report provides information regarding completed, foiled and failed terrorist attacks at an EU level. Europol describes the number and types of attacks in Europe in this recurring report. To read into possible risk factors and trends, it is advised to read this report. For instance, we can see that the total amount of attacks has decreased between 2019 and 2021 (-72,7%). The number of arrests has also decreased by 46,3% within this period. However, this trend is mainly caused by the decrease in ethno-separatist terrorist attacks. Although ethno-separatist attacks for a long time dominated the amount of attacks in Europe, the atrociousness of right-wing and jihadist attacks, possibly caused more fear and feelings of insecurity among European citizens.

Figure 6. Number of attacks based on Europol's TE-SAT reports from 2021 and 2022.

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[40] Europol (2022). *Terrorism Situation and Trend Report. European Union (TE-SAT)*. Pp 7-10. Retrieved on July 27th 2022, URL:
https://www.europol.europa.eu/publication-events/main-reports/european-union-terrorism-situation-and-trend-report-2022-te-sat

Risk analysis

The second step of risk management[41] is the process of risk analysis and can be done in using different measures[42]. A very quick and practical way is to use post-its and place them on a large, printed map of the area. On these post-its, preferably in red, orange and yellow, one can write down a type of threat (for instance a knife- or gun attack). Deliverable 2.1[43] of the ProSPeReS project described how the EU VAT (Vulnerability Assessment Tool) can be used to conduct a risk analysis in a more official way. The new version of this tool, the EU Vulnerability Assessment Checklist (VAC) is will most likely be available to fill out on a tablet, which improves the user friendliness for end users wanting to conduct a vulnerability and risk assessment using this tool.

An important step in risk analysis[44] is to identify the **consequences** and the **probability** of certain types of threats. If we want to determine if we need to protect a place of worship from a weapons attack, we need to analyse if the risk for such an attack is low, medium or high. This can be done by using a risk matrix. A risk matrix calculates the risk of an attack occurring. By multiplying the consequences of a risk by the probability of the risk (consequence *x* probability), we can determine the **risk level** (low, medium or high).

Likelihood (probability)	Consequences		
	Low	Medium	High
Low	Low	Medium	Medium
Medium	Medium	Medium	High
High	Medium	High	High

Figure 7. Risk Matrix Levels

The consequences of an attack need to be discussed. For example, if the consequence of an attack is that many people are injured, do we then consider this to be a high consequence or medium? If we consider the fact that many casualties can also occur, then injuries can be considered as a medium consequence. The same discussion applies to the **probability** of an attack. The abovementioned **risk factors** can influence the probability of a threat occurring.

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[41] International Organization for Standardization (2018). ISO 31000:2018 – Risk management - Guidelines. Retrieved on August 11th, 2022. URL: https://www.iso.org/standard/65694.html

[42] International Organization for Standardization (2018). ISO IEC 31010:2019 – Risk management – Risk Assessment techniques. Retrieved on August 11th, 2022. URL: https://www.iso.org/standard/72140.html

[43] PRoSPeReS Project (2022). Deliverable 2.1 – Manual for Vulnerability Assessment.

[44] International Organization for Standardization (2018). ISO 31000:2018 – Risk management - Guidelines. Retrieved on August 11th, 2022. URL: https://www.iso.org/standard/65694.html

Example:
A special community event is being organised on the parking lot of the place of worship. To assess if organizing this mass will carry along the risk to a vehicle attack, the religious leader, together with his security advisors, decides to conduct a quick risk assessment. They discuss the consequences first. If such an attack would occur and more than 100 people are present during this event, the likelihood of casualties by a truck attack is quite high. Therefore, they fill out **HIGH** in their risk matrix for **consequences**. They then consider the **probability** of it occurring. They weigh in all important risk factors, such as **environmental risk factors** (for instance, recently two opposite groups have been building up violent tension among each other) and **individual risk factors** (one of the visitors has spotted suspicious behaviour in the days before the event). In this example, there have been no signs of suspicious behaviour, but they are aware of some tensions. They consider the probability of an attack to be **MEDIUM**. The final step is to then calculate the consequence and probability: HIGH x MEDIUM and look at the risk matrix. High consequences x medium probabilities adds up to a **HIGH** risk level.

Figure 8. Risk Matrix - example

In determining the probability and consequences of a threat, it is important to also consider the following (risk)factors:

- Relevant licence conditions;

- Event timings and duration;

- The expected number of attendees;

- Arrival, ingress, circulation and egress;

- Audience demographic / profile;

- Previous experience of specific behaviour associated with performers;

- Type of stage barrier and any secondary barriers;

- Provision of seating;

- Rendezvous points;

- Position of temporary structures;

- Positioning of amenities including toilets and welfare facilities;

- Areas of potential high density and pinch points;

- Sight lines and possible obstructions;

- The topography and complexity of the site and surrounding area;

- Uneven ground, presence of obstacles within or around the site;

- Length of perimeter fencing;

- Inclement / Adverse Weather;

- Methods of communicating with the audience during normal and emergency conditions;

- Emergency and evacuation procedures;

- Any other factor that could affect the safety of the audience.

Risk evaluation

After analysing the risks and thus determining if the risk levels are low, medium or high, an evaluation of the results should be conducted for deciding further actions. Depending on the outcome, it can be decided to either try to mitigate the risks, or to do nothing (accept some risks) if it is not necessary for the organization of the event. When risks are considered low, the cost of mitigation can be too high and it will not result in a reasonable cost-benefit analysis for the organisation. When the risk levels are medium or high it is important to try to prevent harm and mitigate the risks[45].

Risk treatment

If during the risk evaluation process, the decision was made to treat the risks, the organisation can decide to actively search for ways and methods to treat the possible risks to their event at the place of worship. The PRoTECT Project[46] helped local authorities to conduct the entire process of vulnerability- and risk assessment and risk treatment afterwards. Within the project, a technology evaluation framework was developed for authorities (or any other type of organisation that needs it) to scout the market and research fields for solutions that can help to better protect public spaces. An organization can for instance send out a **Request for Information** to solution providers, such as companies that produce innovative security technologies or help conduct risk assessments. By sending out a **Request for Information**, an organisation can thus ask companies or research organisations to help them secure their public space (or in the PRoSPeReS project's case: places of worship). The Protection of Public Spaces: Manual for EU[47] describes in detail what the process for scouting the market for innovative solutions can look like. In paragraph 2.3 of this document, an overview on the current State-of-the-art regarding these types of solutions that can help prevent and mitigate attacks, will be described.

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[45] PRoSPeReS Project (2022). Deliverable 2.1 – Manual for Vulnerability Assessment.
[46] PRoTECT Project (2021). URL: www.protect-cities.eu
[47] PRoTECT Project (2021). D4.4 – Protection of public spaces: Manual for EU. Retrieved on April 11th, 2022. URL: https://protect-cities.eu/wp-content/uploads/2021/09/PRoTECT_D4.4_Final_v3.00.pdf

Lite version for Risk- and Vulnerability Assessment

Within the Secu4All[48] project, within the first module of the 4 training modules, a "lite" version for the EU VAT was developed to help local authorities and other important stakeholders in the protection of public spaces to be able to quickly create an overview of the risks of a specific event or a recurring event. This method has also been adopted by the ProSPeReS project within the activities in WP2, in an online manner, while using a fictive situation. However, recently the Secu4All method has been improved by the Dutch Institute for Safe and Secure Spaces (DISSS), to make it even more user friendly, accurate above all, understandable and quick to conduct. In Deliverable 3.3 a specific version for the ProSPeReS project will be developed and explained.
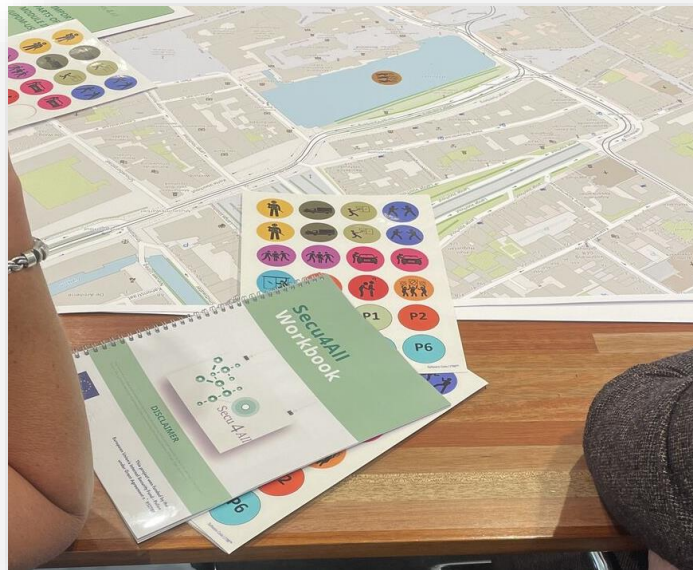
Figure 9. Secu4All Quick Risk and Vulnerability Assessment.

The Secu4All project has also trained these local authorities on how to use security by design methods to help better protect their public spaces. After all, after one has identified, analyzed and evaluated the risks to public space (see Figure 3. Risk assessment process.), the next step is to treat those risks. Treating the risks can be done by using preventative measures of course, or by using innovative novel technologies, Personal Protection Equipment (PPE) for Law Enforcement Agencies and other effective ways to mitigate threats. In the next paragraph, one of the most well-known overarching concepts of reducing threats to public space will be explained.

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[48] European Forum for Urban Security (zj). Secu4All. Retrieved on August 11th, 2022. URL: https://efus.eu/secu4all-en/

2.1.3 Standard for Security by Design: Crime Prevention Through Environmental Design (CPTED)

One of the most well-known social innovation methods, based on the earlier mentioned well-known methods is CPTED[49]. CPTED stands for *Crime Prevention Through Environmental Design*. Eliminating **(physical) environmental risk factors** can be a very effective way to reduce crime and threats.

Figure 10. Vehicle block street furniture.

CPTED, in very short, describes how you can design out crimes. CPTED expert Paul van Soomeren explains that Crime Prevention Through Environmental Design does not focus solely on physical and technical measures to protect public space, but emphasizes the need for social measures as well[50]. The Dutch Handbook on safe design and governance[51] of public space defined four ground rules for safe and secure designs.

- **Visibility** - Individuals want to be able to see and know what is happening in their environment and they want to be able to trust that other individuals know and are able to see the same. Visibility for a large part is determined by clarity, sightlines and lighting, but also by the presence of individuals and capable guardians.

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[49] International Organization for Standardization (2021). ISO 22341: 2021 – Security and resilience – Protective Security – Guidelines for crime prevention through environmental design. Retrieved on August 11th, 2022. URL: https://www.iso.org/standard/50078.html

[50] Soomeren, P. van, (2015). Nederland raakt achterop in veilig ontwerp en beheer. *Stedenbouw en Architectuur (6)*. Retrieved on August 11th 2022. URL: https://www.dsp-groep.eu/wp-content/uploads/PvS_SA6_VOB.pdf

[51] López et al. (2008). *Handboek veilig ontwerp en beheer – Sociale veiligheid in buitenruimten, gebouwen en woningen.* Pp12-18. Bussum: Ita Luten en Uitgeverij THOTH.

- **Unambiguity** – Clarity can be achieved by the avoidance of ambiguity. The marking of zones and spaces means that it should be clear to management and users of any space. The saying of "Good fences make Good neighbours" is the perfect example of the benefits of envoking feelings of security by giving individuals the sense they can easily understand and comprehend the space. Habraken (2004) states that a world without boundaries is a world without social cohesion[52].

- **Accessibility** – Any designed environment should be accessible to everyone, such as emergency responders. The accessibility of any built environment entails the characteristic of public spaces, buildings and homes, that ensure the fact that individuals are able to do what they should be able to do according to the destination of the environment they are in.[53]

- **Attractiveness** – Social security thrives in an environment in which the amount of effort and care for that environment is visible. The aesthetics , sustainability, attractiveness and quality can increase (feelings of) social security[54].

CPTED incorporates these four ground rules on a secure design as well. A concrete example of CPTED and the incorporated groundrules is displayed on Figure 10. These street benches are designed in a way that they can help prevent vehicle attacks. They will block the vehicle, but they have also been designed in a way that they do not envoke feelings of insecurity, but are aesthetically pleasant to look at.

One of the latest, state-of-the-art European methods (that have yet been officially standardized, but are in the process) that is based on 'the originals' like CPTED and UPDM-US is *Crime Prevention Through Urban Design and Planning (CD-UDP)*. CD-UDP is a feasible and effective, multidisciplinary approach to prevent crime – including terrorism – and it helps to reduce feelings of insecurity in public spaces. It was adopted by the *EU COST Action TU1203*[55] in 2014 to emphasize the role of professionals in urban design, planning and management disciplines in crime prevention.[56] CD-UDP not only focuses on current public spaces that have already been designed, but it also focuses on newly planned public space and how to build an environment that can help prevent crime and terrorist threats. The EU Horizon 2020 project Cutting Crime Impact[57] is a good example of the effectiveness of CD-UDP in reducing feelings of insecurity and crimes in public spaces. Secu4All[58][59], an Internal Security Fund - Police (ISFP) Project, educates local authorities and municipalities and other important stakeholders within the protection of public space against any type of manmade threats, on how to use standardized methods such as CPTED to better protect their public spaces. Also, this approach has been standardised both by the European Committee for Standardization (CEN) and the International Organization for Standardization. This approach focuses on the environmental context of crime and security risk. When the approach is well planned and managed, CD-UDP (Based on UPDM-US; CPTED, etc.) is a cost-effective way to improve safety, security and quality of life in public space. Local

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[52] Habraken, J. (2004). Interview on "Security and the Built Environment" in IEEE Technology and Society Magazine.

[53] Wijk (2008). Handboek voor Toegankelijkheid, over de ergonomie van buitenruimte, gebouwen en woningen, 6e druk, Doetinchem: Reed Business.

[54] López et al. (2008). *Handboek veilig ontwerp en beheer – Sociale veiligheid in buitenruimten, gebouwen en woningen.* Pp12-18. Bussum: Ita Luten en Uitgeverij THOTH.

[55] COST Association AISBL (2013). Monitoring Progress Report – Crime Prevention Through Urban Design and Planning. Retrieved on August 11th, 2022. URL: https://e-services.cost.eu/files/domain_files/TUD/Action_TU1203/progress_report/progress_report-TU1203.pdf

[56] Barosso, I., Cardia, C. Nicolini, U, and Wellhoff, F. (2014) Milan: Crime Prevention through Urban Design. Academic research and training. URL: http://costtu1203.eu/downloads/cost-tu1203s-results/

[57] Cutting Crime Impact (2018). *Review of State of the Art: CP-UDP*. Retrieved on April 25th, 2022. URL: https://www.cuttingcrimeimpact.eu/download/may-2019_d25_1014042704.pdf

[58] European Forum for Urban Security (zj). Secu4All. Retrieved on August 11th, 2022. URL: https://efus.eu/secu4all-en/

[59] DSP Group (zj). *Secu4All – Towards ensuring safer public spaces together. Training local authorities to provide citizens with a safe urban environment by reducing the risks in public space.* Retrieved on August 11th, 2022. URL : https://www.dsp-groep.eu/projecten/secu4all-towards-ensuring-safer-public-spaces-together/

social context and cultural aspects are crucial to any type of success of implementing social innovations in general.

2.1.4 State-of-the-art procedures and cooperation protocols: Event management – Purple Guide

When it comes to standards, a lot has been done when it comes to managing spaces where events take place. An event is an organized activity that attracts a relatively large number of visitors for a short period of time. The definition of an event according to the WHO: "*An event is characterized by a concentration of people, who are at a specified location, for a specific purpose and a certain period of time. This concentration of people (mass gatherings) can lead to pressure on the regular care of a municipality, region or country*[60]".

Events can be devided in:

- **Location**: from meadow to city centre

- **Size**: from small to very large;

- **Appearance**: from local to international;

- **Time**: from day to night, from weekdays to weekends;

- **Start and end times**: fixed times (football match) or not (braderie, Parkpop);

- **Means of transport**: sometimes the car is dominant, sometimes not.

Often events have a friendly character. Someone is responsible for the event and is accountable to the government. An event has a limited duration; well-known public attractions such as the Efteling or the tour boats of Amsterdam are not events (a football match in a stadium is a borderline case). An open day at a primary school is of a different order than a flying show. From experience, events of up to 30,000 visitors per day are relatively simple. In addition, the organisation of transport is becoming more complex. Whether a large event causes mobility problems depends on the location of the area (rural/ urban), the availability of public transport, the distribution of visitors in the area (cycling round vs. Pop concert) and whether there are fixed start and end times.

The information contained in this paragraph describes state-of-the-art, good practices, mainly based on the well-known standardized guideline (such as the Purple Guide[61]) that should be considered by event organisers. However, it provides industry guidance and does not cover all aspects that organisers should take into account when organising a specific event.

The Purple Guide is the UKs comprehensive guide for the Events Industry and regulators at local authorities, emergency services and the various contractors and sub-contractors who collaborate to deliver various types of public and/or commercial events. An overview on the chapters that have been described in the oficial Purple Guide, see Appendix A – the Purple Guide; Chapters overview

. The guide aims to give organisers a single reference source to the things they need to take into

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[60] World Health Organization (2015). *Public Health for Mass Gatherings: Key Considerations.* Retrieved on June 22nd 2022, URL: https://apps.who.int/iris/rest/bitstreams/717805/retrieve

[61] Food, Events and Things (2022). *The Purple Guide to Health, Safety and Welfare at Music and Other Events*. EIF Ltd, Chepstow: UK. Retrieved on June 22nd 2022, URL: https://www.thepurpleguide.co.uk/index.php/the-purple-guide

consideration when putting on and managing an event and sets standards for all aspects of even to planning and management – including planning for and managing an emergency. The guide contains 31 chapters, each covering a different aspect of the infrastructure involved in putting on an event. Each chapter has been developed through working groups made up of specialists from across the industry, local government and emergency services.

Key points

The safety and enjoyment of people attending an event, will depend largely on the effective management of the crowd. **Crowd management** is a critical part of an overall operational plan, the extent of which should reflect the complexity and risk associated with the event. It is not crowd control but a complete system of management. In addition to the aspects covered in this chapter, other factors discussed elsewhere in The Purple Guide have been referenced throughout this chapter.

Preparing Your Plan

1. The preparation of a Crowd Management Plan is an essential part of the event management planning process. It should be prepared by a competent and qualified person who has the knowledge and experience necessary to identify crowd specific hazards and propose suitable measures to reduce risk. In some cases, specialists are appointed to direct and manage crowd safety, though this may not be suitable for all events.

2. The Crowd Management Plan, the Event Management Plan and associated Risk Assessments should be dynamic, 'living, breathing' documents, prepared separately yet in tandem with each other. Additionally the relationships and communication between all parties involved in the planning process must be open, transparent and honest.

3. The Crowd Management Plan will identify, eliminate and control hazards and risks related to the tasks required of security, stewards and other crowd management personnel. This is distinct from the overall event management plan which should focus on hazards and risks that might impact on those attending the event, including personnel, contractors and performers. In each case the appropriate risk assessment should be included.

4. Crowd management should be considered as an essential element from the start of the event planning process to ensure that the correct design, information and management system is developed in tandem with the event plan.

   • Choosing the correct barrier system or fencing is vital to ensure crowd safety. Understand the different types, their strengths and appropriate uses

   • Select a suitable supplier, who will be able to provide all the necessary drawings, plans and risk assessment

   • A barrier system must be built in the correct way to ensure it does not pose any risks to the general public

There are many models in existence that can be used, the original of these being DIM-ICE, which is Design, Information and Management during Ingress, Circulation and Egress. See also section 13.43- 13.50 - Crowd Dynamics & Risk Modelling in the Purple Guide. While every plan is unique to its specific event, it must detail some basic tenets to be effective, such as;

- A Site Inspection's Findings
- A Crowd Risk Assessment

- A Crowd Dynamics Assessment

- The deployment of Crowd Management Personnel, including roles, numbers and timings sufficient to deliver a safe event

- Methods of Working

- Safety and Welfare of Personnel

- Command, Control and Communication

- Audience Demographic and likely behaviours of the crowd in question

- Methods and Routes of Ingress, Circulation and Egress

- Consideration for the Safety of the Crowd when arriving and leaving the site, known as 'Zone Ex' or the 'Last Mile'

- Contingency Planning e.g. backup communications systems

- Emergency Procedures e.g. evacuation, invacuation

5. Events, venues and their locations comprise a number of defining characteristics which can individually or collectively influence crowd management. A site survey should be carried out during the early planning stage.

6. Organisers of smaller events should refer to local standards and rules.

7. A crowd management plan should contain a Statement of Intent or Memorandum of Understanding that summarises the different roles and responsibilities of those with the authority to implement the plan. The aim of the statement is to ensure that each decision-making organisation is clear about where it's responsibility begins and ends e.g. event organisers, crowd managers, police, etc.

8. The Statement of Intent or Memorandum of Understanding should be a concise document that each party formally signs to indicate that they understand and accept their area of responsibility. It should not differ from any contractual obligations and it is not a legally binding contract, though the content may refer to guidance and legislation that defines within which boundaries the crowd management services will operate. It may also provide a general definition of security and crowd safety related functions.

Emergency services

The emergency services in the case of religious gatherings can be identified as fire brigades and medical services.[62] Different involvement of emergency services can be envisaged depending on the nature of the religious gathering. In the most cases of religious gatherings, both the fire brigade and the medical services will operate routinely. This means that they are stationed in their standard locations and take the response after receiving information from the emergency number. On the other hand, in case of large scale religious events special measures are required. The presence of paramedics in the crowd of the faithful, first aid posts, allocation of emergency services resources to the event site neighbourhood are possible. Extra ordinary gatherings like World Youth Days it is common to establish field command post and command posts at local and higher levels. Those command posts should

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[62] PRoTECT Project (2021). D4.4 – Protection of public spaces: Manual for EU. Retrieved on May 24th, 2022. URL: https://protect-cities.eu/wp-content/uploads/2021/09/PRoTECT_D4.4_Final_v3.00.pd

cooperate with command posts of LEA's and other stakeholders.

2.1.5   State-of-the-art procedures and cooperation protocols: Legal framework for events

The provisions of EU Charter of Fundamental Rights are clear about the inalienable rights of the person to express freely his/her religion and freely peaceful assembly. According to **Article 11: Freedom of assembly and association:** *Everyone has the right to freedom of peaceful assembly and to freedom of association at all levels, in particular in political, trade union and civic matters, which implies the right of everyone to form and to join trade unions for the protection of his or her interests[63].* In addition, according to **Article 10 - Freedom of thought, conscience and religion** 1*. Everyone has the right to freedom of thought, conscience, and religion. This right includes freedom to change religion or belief and freedom, either alone or in community with others and in public or in private, to manifest religion or belief, in worship, teaching, practice and observance. 2. The right to conscientious objection is recognised, in accordance with the national laws governing the exercise of this right.*[64]

Permits in general

In the EU context, public spaces include, open squares, pedestrian streets, night life areas, museum, metro stations, places of worship, and other areas of high crowd concentration (Council of the European Union, 2021). In respect to events held at such places, there is no EU legislation that foresees a legal procedure for organizing or hosting an event, whether this refers to music festivals, street markets, flew markets, fairs, sporting events and others. Considering this, the procedure for acquiring a permit to hold an event in public spaces, is defined by each state's legislative framework. In general, the legal prerequisites for the occupation of a public space, are similar among different European countries. These may include the request for an event permit from the corresponding municipality[65], and/ or a permit from the local/regional police or traffic department (in case traffic restrictions apply)[66]. In some instances, a permit signed by both authorities may be required, or a simple notification to the to the city municipal authorities may suffice[67]. In addition, in some cases, public events are distinguished from public gatherings. In the case of Sweden for example, assemblies for religious purposes are included in the latter category. In the case of Greece, the general approach dictates that the entity wishing to host an event at a public space must request a permit from the competent authorities, or a land/ space grant from the legal owner the space in question. For public spaces (excluding semi-public) strictly, that would be the local municipality in most cases. However, if an event is to take place at a site owned by another organization, such as a religious site, a grant for the space in question must be requested by the respective regional Metropolis.

Other permits

COVID-19 Measures: In respect to large gatherings in public spaces during COVID-19 pandemic, specific guidelines were issued by all European States, posing regulations, and providing guidelines for their safe operation, restricting event organization and large gatherings. These were related to the maximum allowed number of people at a given area (open or closed), rules for the sites' operation,

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[63] European Agency for Fundamental Rights (2022). *Article 12 – Freedom of assembly and association*. Retrieved on May 24th, 2022. URL: https://fra.europa.eu/en/eu-charter/article/12-freedom-assembly-and-association#explanations

[64] European Union Agency for Fundamental Rights (2022). *Article 10 – Freedom of thought, conscience and religion*. Retrieved on July 14th 2022. URL:https://fra.europa.eu/en/eu-charter/article/10-freedom-thought-conscience-and-religion#:~:text=1.,%2C%20teaching%2C%20practice%20and%20observance.

[65] Police of Finland (2022). *Public events*. Retrieved on July 14th 2022. URL: https://poliisi.fi/en/public-events

[66] Police of Sweden (2022). *Apply for a permit for a public event*. Retrieved on July 14th 2022. URL: https://polisen.se/en/services-and-permits/permits-and-licences/permit-for-a-public-event/

[67] City of Amsterdam (2022). *Organising an event: notify the city or apply for a permit.* Retrieved on July 14th 2022. URL: https://www.amsterdam.nl/en/business/event-permit/

rules of attendance, such as the mandatory use of masks, and others. As an example, among other public spaces, these regulations foresaw the operations of Places Worship in Greece[68].

Drones: Permissions are also required for the flight of drones in the EU area. Each member of EASA must determine drone geographical zones[69], which are areas where drones may not fly (e.g. national parks, city centres or near airports) or may fly only under certain conditions, or where they need a flight authorisation[70].

In the case of Greece, that authorization request must be made to the (National) Civil Aviation Authorities. After the permission is granted and if the flight, will take place over critical (public/ private) or governmental infrastructure, a respective notification of the flight must be provided. The use of drones in the EU is defined by Regulation (EU) 2019/947[71], Regulation (EU) 2020/639[72], Regulation (EU)2020/746[73], Regulation (EU) 2020/1058[74].

2.2 State-of-the-Art: Science

This deliverable 3.1 will analyse and assess the relevance of the state-of-the-art achievements in public places protection, security by design, novel detection technology, equipment, PPE, procedures and training and cooperation protocols. The **state-of-the-art describes the capabilities with regards to standards, science and technologies**. In this chapter the scientific point of view, and the importance of testing the efficacy of programmes and technologies will be discussed. It will also discuss the different social and criminologically relevant scientific theories, that can help to prevent threats to public space.

2.2.1 Risk treatment

In paragraph **Błąd! Nie można odnaleźć źródła odwołania.**, the Risk Management Guidelines by ISO (31000:2018) have been discussed. After an organisation has either quickly, in a continuous manner, or elaborately has conducted a risk assessment, the next step would be to treat the risk. During the risk assessment process, they will have identified, analysed and evaluated the risks. If during the evaluation, the managing body of the event has determined that the risk should be mitigated to prevent a possible threat, the next step would be to treat those risks. Risks can be treated up front (by preventative measures) or by decreasing the impact in the case of a threat, by using specific types of mitigation techniques. To treat risks up front, social innovations can be of good help.

2.2.2 Social innovations

Social innovation as a concept is defined by Westley and Antadze (2010)[75] as *'introducing new products, processes or programs that profoundly change the basic routines, resource and authority flows or beliefs of the social system in which the innovation occurs'*. The goal of social innovation is to disrupt the basic beliefs by challenging the social system and the social institutions that govern conduct, conducted by individuals. This happens by affecting the fundamental distribution of both power and resources. In the case of protecting public spaces, social innovation would be helpful to solve several problems regarding the protection of different types of public spaces of interest. Examples of social

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[68] Retrieved on July 14th 2022. URL: 2022_05_16 Νέο ΦΕΚ-ΚΥΑ έως 1 Ιουνίου.pdf | Powered by Box

[69] Retrieved on July 14th 2022. *Drone Aware – GR*. URL: https://dagr.hcaa.gr/#map_page

[70] European Union Aviation Safety Agency (2022). *Can I fly my drone anywhere I want to?* Retrieved on July 14th 2022. URL: https://www.easa.europa.eu/print/pdf/node/116463

[71] EUR-Lex (2022). *EU Regulation 2019/947*. Retrieved on July 14th 2022. URL: EUR-Lex - 32019R0947 - EN - EUR-Lex (europa.eu)

[72] EUR-Lex (2022). *EU Regulation 2020/639*. Retrieved on July 14th 2022. URL: EUR-Lex - 32020R0639 - EN - EUR-Lex (europa.eu)

[73] EUR-Lex (2022). *EU Regulation* 2020/746. Retrieved on July 14th 2022. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R0746&from=EN

[74] EUR-Lex (2022). *EU Regulation* 2020/1058. Retrieved on July 14th 2022. URL: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32020R1058&from=EL

[75] Westley, F. & N. Antadze (2010). *'Making a difference. Strategies for scaling social innovation for greater impact'*. The Innovation Journal: The Public Sector Innovation Journal, 15(2).

innovations, that target several problems regarding the development of risk factors (which will be explained in the next paragraph) are 'hip hop youth problem workshops', helping youngsters with dark thoughts to express them through music, street coaches in Amsterdam Nieuw-West[76], etcetera. There are also many claims that community policing efforts are effective in the prevention of radicalisation among youngsters, yet scientists have analysed 2273 studies and concluded that only one of these studies met the quality criteria of effectiveness towards the reduction of radicalisation[77]. For that reason, it is highly important not to just 'trust the fact' that police will always solve society issues and remain critical towards any type of programme when we are seriously protecting public space against terrorist attacks. It takes a multi-stakeholder approach to prevent harm in public spaces. This multi stakeholder approach reveals the fact that with different types of glasses, you see different things. An urban planning expert will view a public space with 'pink glasses' and will see it's designing potential, without keeping in mind the struggles for police in their daily work, wearing 'blue glasses' and vice versa. Implementing social innovations should therefore not be taken lightly and be implemented in a rush, but instead need elaborate research of the factors that might play an important part of the (possible) risks in a specific public space. As mentioned in paragraph 2.1.2, risk assessment can help to identify and analyse the different risks to public space – which again should always be done in a continuous manner. One type of outcome can of course be that there are no risks or very slim chances of any type of risks occurring. Another type can be that the levels of a potential risk occurring, are very high. In that case it is advised to not only treat the risks in a repressive manner (by 'pumping up' the security measures), but also in a preventative way. This can be done by first analysing the risk factors mentioned below and based on those risk factors, to think of ways to implement (social) innovations.

2.2.3 Risk factors in the environment of public space

Environmental Criminology is the study of contextual risk factors (that can be identified during the risk assessment process) that can play an important role before, during and after any type of threat. There are generally two types of risk factors as described in chapter 2.2.1 the individual risk factors and environmental risk factors. The environmental risk factors as described such as the social environment of the public space (Is there social disorganization or cohesion? Are there many different groups with tensions in between them? Etc.) Social innovations can counter these types of environmental risk factors that can increase the risk of terrorist threats in public space.

The spirit and essence of true public space is that it is free to every citizen and it implies accessibility to all, without direct cost, with no other goal than to contribute to the quality of urban life. That also makes it very vulnerable against those that want to victimize the citizens that enjoy the openness of public space.

That individual, that wants to victimize individuals in public spaces, needs to be motivated to commit a crime. And these motivations differ between types of actors and types of target, but any offender, according to the criminologically 'standardized' **Routine Activity Theory[78] (**Figure 11**)**, will be motivated when there is an *absence of a capable guardian* (such as security measures, CCTV, police presence) and *a suitable target* (an open field where many people come together in the case of a terrorist attack or a crowded area in the case of a thief). When protecting your public space, this dimension is very important to take into consideration.

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[76] Stichting Aanpak Overlast Amsterdam (SAOA). *Straatcoaches.* Retrieved on May 23rd, 2022. URL: https://www.aanpakoverlast.nl/#straatcoaches

[77] Mazerolle, L.G. et al. (2020). *Police programmes that seek to increase community connectedness for reducing violent extremist behaviour, attitudes and beliefs.* Oslo: Campbell Systematic Reviews.

[78] Cohen, L. E., & Felson, M. (1979). Social Change and Crime Rate Trends: A Routine Activity Approach. American Sociological Review, 44(4), 588–608. https://doi.org/10.2307/2094589
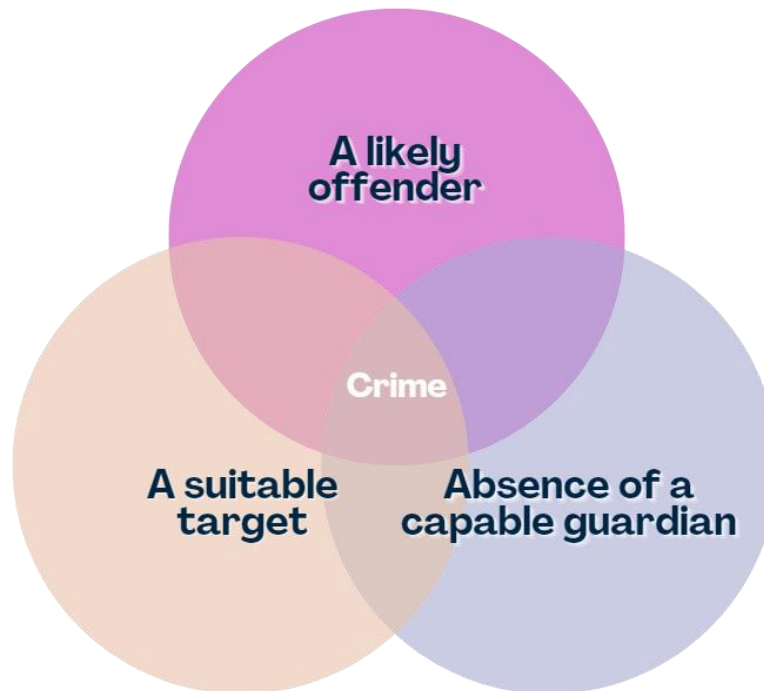
Figure 11. Routine Activity Theory

By understanding how perpetrators and their motives work by identifying these **risk factors** and seeing them as the factors that can "make a target more suitable for them", one can prevent the chances of the threat actually occurring. If we look at the Routine Activity theory, it states that if all three elements are present, the chances of a crime happening are very likely. But if we make sure that our possible target becomes less suitable (by conducting risk- and vulnerability assessments and adopting measures) and if we make sure that a capable guardian is present instead of absent (by having a security plan in place), we eliminate two of the three factors. And by eliminating these two, the likely offender is of course less likely to become an offender. It is all about opportunity. If we take out the opportunity of an individual to carry out an attack against a target, the offense becomes less likely.

By looking at crime prevention from a social perspective, we can dive into the different **environmental risk factors** as well and help to eliminate of decrease these risk factors, for instance by using standards for security by design to improve the security in public spaces of interest as described in paragraph 2.1.3.

2.2.4   Aftermath of terrorist attacks in public spaces

This deliverable describes and researches the state-of-the-art in the protection of public space. However, in some cases, state-of-the-art protocols and guidelines do not take into account the possible aftermath after a terrorist attack. Examples are the guidance for Public Spaces of Interest (PSOI) in case their PSOI needs to remain closed for further investigation, or the psychological aftermath and aftercare for relatives or loved ones of victims of a terrorist attack. The consequences can endure very long in the lives of the individuals harmed by the attack.

Direct aftermath

To be able to understand the human behaviour in public space, it is highly important to conduct research on environmental psychological and criminological aspects of geographic behaviour of humans. Why do they move in certain directions and why do they commit crimes in specific areas? If we can analyse these patterns, we can also start predicting them and thus prevent possible (additional) harm to public space. In the previous paragraph we have analysed the behaviour of the perpetrator intentionally causing harm and choosing his or her soft target, based on its vulnerabilities (such as the absence of a capable guardian). In this paragraph, the behaviour of the possible victims will be analysed and described. To prevent or at least minimize harm to the citizens that are present at a public space of interest pre, during or after a terrorist threat, we need to understand the way individuals tend to move and act. The earlier mentioned crowd management analysis tools (see paragraph 2.3.1) can help to predict these kinds of behaviours to help prevent harm in the future.

Five psychosocial aspects of incident management

One of the examples of analysing crowd movement after an attack is the way in which psychosocial aspects can influence the mass casualty decontamination incident management procedures that are carried out by first responders in the case of Chemical, Biological, Radiological and Nuclear (CBRN) incidents. The decontamination is employed by first responders directly at the scene after an incident that involves noxious contaminants (hazardous substances). Several member states have been challenged during the decontaminating of large numbers of affected casualties using the existing protocols in place. In their research paper, Carter et al. (2016)[79] have analysed decontamination guidance for emergency responders and associated research evidence, *"in order to establish to what extent psychosocial aspects of casualty management have been considered within these documents"*.

The review of the analysed guidance documents that Carter et al. (2016) have researched, reveals that the documents contain some information related to the different psychosocial aspects of mass decontamination, such as 1) likely public behaviour, 2) effective communication with members of the public, and 3) respect for public needs for privacy. The information within these documents however, is often very limited and lacks recognition of the fact that understanding the importance of the psychosocial aspects of decontamination, will be crucial to the success of the decontamination process. Reviewing the evidence reveals the fact that multiple studies have been conducted within the field of psychosocial aspects of mass decontamination. Subsequently, the findings of these studies could (or should) be used in order to better inform guidance and training for emergency responders. Cartel et al. note that there are several inconsistencies they have discovered between the guidance documents on decontamination and the available evidence. The main areas of these inconsistencies are likely public behaviour, overall management strategy, and the amount of importance placed on communication. The studied available research evidence shows that these factors should be considered as critical success factors with regards to incident management. However, this has not (yet) been consistently reflected upon within the guidance documents that have been reviewed by Carter et al. (2016). *"A key difference between guidance documents and available evidence is the description of likely public behaviour".* Even though the studied evidence clearly states that members of the public will behave in quite an **orderly and cooperative way**, this fact is not reflected in the guidance documents that are being used by emergency responders and trainers. This belief regarding the disorderly public behaviour, could be the factor that negatively effects the majority of the guidance documents; 10 out of 19 guidelines that were reviewed, highlighted the need to **control, rather than communicate with, members of the public.**

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[79] Carter H, Amlôt R. (2016). *Mass Casualty Decontamination Guidance and Psychosocial Aspects of CBRN Incident Management: A Review and Synthesis.* PLOS Currents Disasters. Retrieved on July 27th 2022. URL:
https://www.researchgate.net/publication/309700033_Mass_Casualty_Decontamination_Guidance_and_Psychosocial_Aspects_of_CBRN_Incident_Management_A_Review_and_Synthesis

This shows that the need for an all-round protection of public spaces guidebook (and system) is needed to guide first responders and other types of important stakeholders in the protection of public spaces is high. If the expected behaviour of large crowds, based on former notions, actually differs quite a lot from the current guidance documents, it is of utmost importance that the most current public behaviour research will be taken into account.

Recovery phase

Another example of a possible consequence of a terrorist threat aimed at a public space of interest (PSOI) is the inability to use the PSOI in the phase after the attack. If the PSOI is marked as a crime scene for a terrorist attack, it may need to be preserved for crime analysis and evidence gathering for some days after the response phase. Therefore, PSOIs should anticipate having their operations/business interrupted for some day before a 'clean-up' can be organised. In the case of CBRN-e materials, that clean-up may be highly specialised and take a very long time. There is also an issue about public confidence to return if it has been the scene of deaths and atrocities or might still be contaminated with CBRN-e materials.

Aftercare - Psychological Consequences of Traumatic Events

A third example of aftermath risks that need to be considered after an attack is the immaterial damage an attack can cause, such as psychological consequences for victims and/or relatives. Most terrorism victims are innocent citizens who find themselves in the wrong place at the wrong time, randomly targeted in brutal attacks. In the aftermath of attacks, the lives of survivors and their families are irreparably damaged. The recovery process for many survivors from physical and mainly psychological injuries or coming to terms with their losses can take years, and many remain deeply traumatized.[80] As defined by the Diagnostic and Statistical Manual of Mental Disorders—Fourth Edition (DSM-IV), a traumatic event—or witnessing such an event—triggers fear, helplessness, or horror in response to the perceived or actual threat of injury or death to the individual or to another. Traumatic events are usually perceived by the individual to be life-threatening, unexpected, and infrequent, and are characterized by high intensity. In general, people exposed to a traumatic event are more likely to suffer from acute stress disorder, posttraumatic stress disorder (PTSD), major depression, panic disorder, generalized anxiety disorder, and substance use disorder.[81] Those who experience terrorist attacks are likely to suffer from short-term and long-term stress-reactions, anxiety, and depression in the long run.

A terrorist attack, or the threat of a terrorist attack, may have more severe psychological consequences than other types of traumatic events due to a perceived lack of control. Individuals tend to perceive risk differently depending on whether they feel they have control over an outside event, how familiar that event is, and how catastrophic it will be. An activity or event that an individual can control is more likely to be perceived as safe. In this situation, distancing oneself from the population at risk becomes less effective if the risk seems random. Most people will experience stress-related symptoms in the aftermath of a terrorist attack.

A special mention should be made of chemical, biological, radiological, and nuclear terrorism (CBRN). They are unidentified, usually undetectable, and often perceived as particularly unfair and reprehensible. The presence of these qualities makes them more challenging psychologically. Another unique and potentially stressful aspect of CBRN terrorism is the incubation period during which an individual may have been exposed to an agent but may not know the outcome. When a bomb goes off or another physical terrorist attack occurs, the individual will know immediately if they have been

[80] UNODC (2022). Terrorism Prevention: Victims of terrorism. Retrieved on June 1st 2022, URL:
https://www.unodc.org/unodc/en/terrorism/expertise/victims-of-terrorism.html

[81] Butler, A.S., Panzer, A.M & Goldfrank, L.R. (2003). Preparing for the Psychological Consequences of Terrorism: A public health strategy. National Academies Press: Washington, URL: https://www.ncbi.nlm.nih.gov/books/NBK221638/

physically harmed. The role of apparent anxiety in people due to the possibility of exposure to a chemical or biological agent may be difficult to distinguish from direct behavioural or neuropsychological changes due to exposure to the agent in cases of CBRN terrorism. Symptoms of a chemical and biological weapon attack may initially appear as neuropsychological symptoms. Among the effects of an acute poisoning with an organic phosphorus compound (e.g., sarin) are confusion, difficulty concentrating, and drowsiness; an individual exposed to cyanide may initially experience anxiety and agitation, reflecting tissue hypoxia; and exposure to fungal toxins may result in psychosis, somatic complaints, anxiety, and involuntary movements. Furthermore, physical manifestations of panic such as shortness of breath might be mistaken as symptoms of infection or contamination, which then becomes a self-reinforcing cycle as the individual's panic is increased by the shortness of breath, resulting in an exacerbation of this symptom.

2.3 State-of-the-art: Technologies

In addition to social innovations, the earlier mentioned five types of (technological) measures can help to prevent terrorist threats in a concrete manner. The term **Government 4.0**[82] refers to the public sector operating in the digital "Industry 4.0" age (also known as 'smart industry'). Similar to privatised companies, governmental and public organisations too have been pressured to digitize their services and internal processes, to grow together with society. The industrial trend 'Industry 4.0', together with the **Internet of Things (IoT)**, is an active industrial revolution in the automatization industry. Smart Industry is a concept that pops up worldwide in all kinds of industries and thus also pops up in public bodies. Smart Industry (4.0) is about more than just technology. It is also about sustainability, climate and increasing globalization and making the world a safer place. The rise of Smart Industry heralds a whole new era. It is not called the 4th industrial revolution for nothing. There is a global change going on and everyone is affected in one way or another.

The goal of this Smart Industry 4.0 trend is to improve the quality and efficiency of products and to improve the flexibility of the process and the productivity. This process of making things smarter is inseparable from the use of smart sensors, also known as **sensors 4.0**. The use of these innovative industry 4.0 technologies, can help to create a clear picture regarding possible threats and to better intervene when such a threat is active. Before you start scanning the market for Industry 4.0 solutions, it is wise to know what types of measures can be helpful in the case of treating the risks to public space. The PRoTECT Documentary[83] provides an informative overview on the process and all types of measures for the protection of public spaces for local authorities and other stakeholders.

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[82] McKinsey & Company (2018). *Public Services; Government 4.0 – the public sector in the digital age*. Retrieved on July 27th, 2022. URL:https://www.mckinsey.de/publikationen/leading-in-a-disruptive-world/government-40-the-public-sector-in-the-digital-age
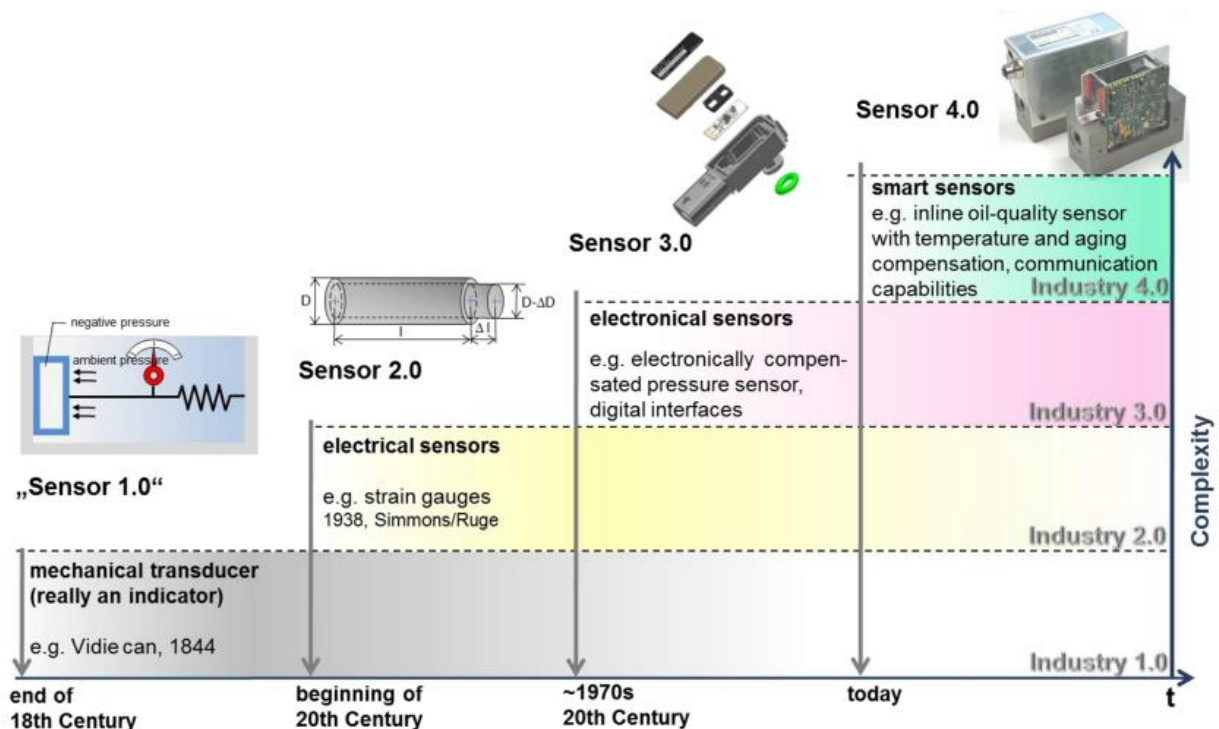[83] PRoTECT (2022). PRoTECT Documentary on the protection of public space. URL: https://www.youtube.com/watch?v=TAMxoRu4BaA&t=19s

Figure 12. Industry 4.0 and sensors[84].

In addition to the PRoTECT project's outcomes, the within the project developed website of Urban Securipedia[85], provides a detailed overview on different types of measures that can be implemented (especially during events) to help mitigate these risks. These event-driven treatments or solutions to reduce vulnerabilities and to mitigate risks, are best summed in in five categories.

2.3.1 State-of-the-art technologies: Novel detection technology

1. **ICT**; used for the communication, storage, analysis and protection of information (such as WiFi, IoT, Encryption, VPN, etc.); but also training and simulation software to see in what way a mass of people could move,

2. **Sensors**; used for detection, identification, localisation and/or tracking (such as CCTV, facial recognition, etc.);

Sensors can be seen as the eyes and ears of the public. Sensors can form the sixth "sense" of public space. There are different types of sensors, which can be supported by the software that accompanies them, which in turn can be seen as their "brain" processing the information that is coming in through the hardware (eyes, ears, etc.).

3. **Actuators**; used for warning, interception or elimination (such as sirens, anti-drone drones, or any IFTTT (if this, then that) type of actuator);

An actuator is a responsive piece of hardware or software. Simply explained, it is a "if this, then that" type of responsive measure. For instance, if one of the smart listening sensors (its ears) has

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[84] Schütze, A., Helwig, N. & Schneider, T., (2018). Sensors 4.0 – Smart sensors and measurement technology enable Industry 4.0. *Journal of Sensors and Sensor Systems (7)*. URL: *https://jsss.copernicus.org/articles/7/359/2018/*
[85] Urban Securipedia (2021). *Event-driven measure types.* Retrieved on April 25th, 2022. URL: https://securipedia.eu/index.php/Measures

detected that a vehicle is speeding up, in the ideal world a hardware actuator ('brain signal') could be that all of the street bollards automatically come up. An example of a software actuator could be that a silent alarm would go off to the police or other important security organisations will go off, so they can quickly arrive at the scene. Examples of hardware actuators are bollards, fences, emergency/fire doors coming up or down, opening/closing, lights switching on, (silent) alarms, smoke machines, scent machines and so on.

4. **Physical measures;** used for access control or as protective materials (such as Crime Prevention Through Environmental Design (CPTED) of Security by Design measures – park benches that are bullet proof for instance);

5. **Methods;** used for procedures, best practices or standards to implement solutions. Again, a perfect example of this fifth category are the Risk Management Guidelines ISO 31000:2018 or trainings.

The methods regarding the mitigation of threat to public space have been described in the chapter regarding state-of-the-art standards, which is Paragraph 2.1.

To sum it up, the hardware collects the data and the software processes the data. A trend that is occurring nowadays is the fact that the integration between hardware and software is growing. Artificial Intelligence is taking mayor steps in developing and growing. The analogy of eyes and ears communicating with the brain is therefore an easy way to explain how AI works. The table below gives an overview of the different types of sensors.

Type	Hardware	Software	Example
Sound sensoring	High-performance microphones (up to hundreds of mics in 30cm²) can detect sound and exactly where it is coming from (up to 50cm accuracy).	By using machine learning there now is a library of sounds, so the software can indicate whether it is breaking glass, explosions, gunshots, stress, et cetera. It can indicate the exact location of the sound (or the line of noise, from A to B).	www.sorama.eu
Facial recognition	By using 3 **high resolution** cameras, anyone can create a 3-dimensional 'picture' of a given space and the individuals moving in that space.	With machine learning techniques, the software can search through images and compare faces to a 'list' of unwanted (or wanted) individuals within the software library. This is done in milliseconds.	Facial Recognition Software - NEC Software Solutions (necsws.com) High resolution cameras
Object recognition	Using **high resolution** cameras (most used are Axis, but all existing high resolution cameras can be used), video images are captured and sent to the server (or processed at or within proximity of the camera, with Edge computing).	The software can detect the type of object (transport, luggage (either left behind or not), etc), which type per object (car vs. truck) and directions in which it is heading and the speed in which it does.	Home - ViNotion

		It can also detect **crowd behaviour** by analysing the trajectories of individuals moving within the sight of the camera. It displays the trajectories in different colors is any anomalies have been detected, as opposed to facial recognition software and is thus GDPR compliant.	
Drones	A UAV (Unmanned Aerial Vehicle) can fly on itself (AI) or can be controlled by a groundbound operator and have various sensors like (infrared) cameras, microphones, air sniffers, radiation meters, et cetera. The drone sends all data to the server.	After receiving the data of the drone, the software can then process the data and trigger actuators (see next paragraph) or put the outcome on a dashboard.	Home - DroneMatrix Over D2G (dutchmobilityinnovations.com) (Dutch Only!)

Table 1. Overview on sensoring types.

The use of sensors could help to create a capable guardian (explained in paragraph 22.2.3) within the protection of public space. A sensor can be seen as the eyes and ears of the public space. The controller can be seen as the brain that receives the signals from the sensors and translates them to an action (the classical if this, then that), that in turn will be sent to the actuator; if this occurs, then that should happen. All of these parts together can be viewed as the brain of a capable guardian that protects public space; a form of artificial intelligence.
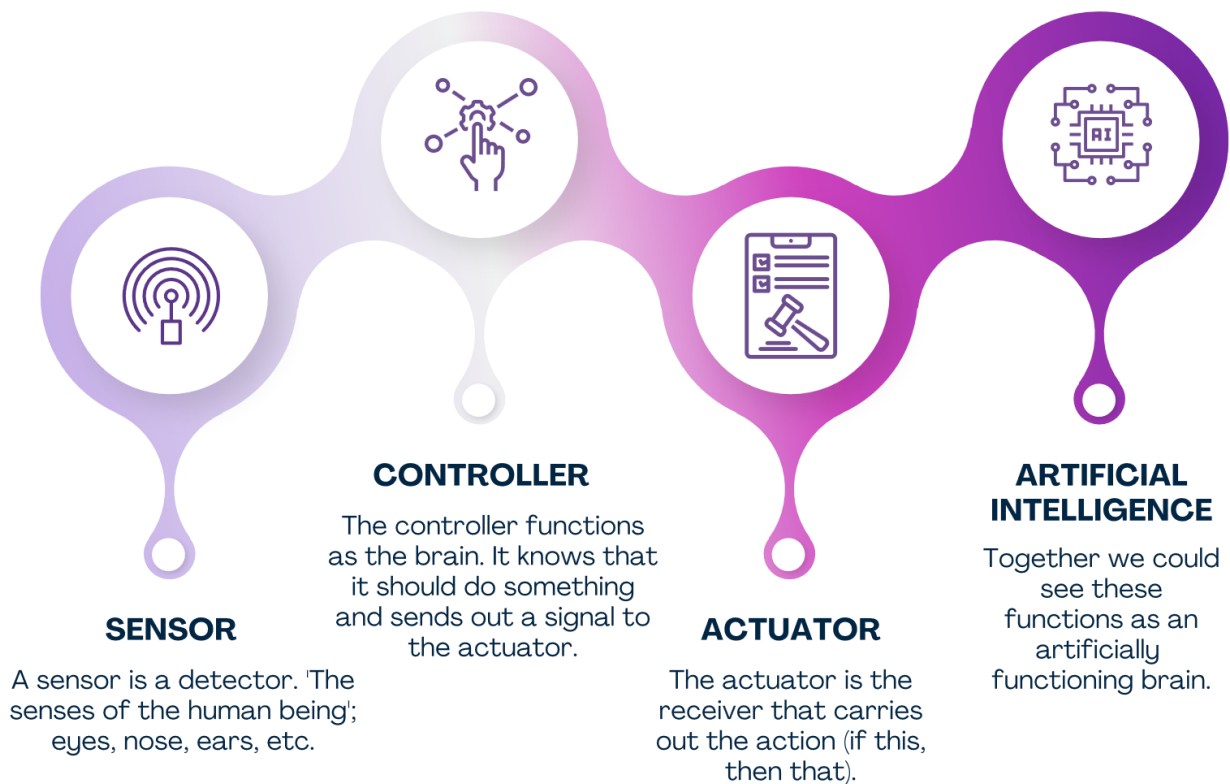
Figure 13. Sensors, controller, actuators and AI.

2.3.2 State-of-the-art technologies: Equipment

Furthermore, beside protecting public spaces with innovative novel technologies and the right procedures and training, a threat may still occur. To help stop the imminent threat at hand, different types of valuable equipment can be used (if they have not yet been designed into the public space by CPTED measures).

A proper and comprehensive approach to protect the public space often represents a substantial financial investment. In Deliverable 3.4 of the ProSPeReS project, a guideline for solutions used in public buildings as a suggestion for existing applications will be elaborated. Not all of these solutions can be applied to every place, but they can be a guideline for which the equipment applications should be directed.

A quick overview of the different types of possible equipment for the protection of public spaces in general has been provided by the PRoTECT project and has been published on Urban Securipedia[86]. Also, Deliverable 3.4 will give a specific overview with regards to the protection of places of worship.

Target hardening, together with all previously mentioned methods and technologies, access control, directing trafficking flows and removing means that can aid a perpetrator in committing a crime, can make that same crime more difficult and reduce the opportunities for criminals to achieve their goal (reducing the suitability of the target and increasing its capable guardian as mentioned in Paragraph 2.2.3). Dependent on the type of crime the realisation of this measure can take various forms, ranging

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[86] Urban Securipedia (2022). Measures. Retrieved on August 31st 2022. URL: https://securipedia.eu/index.php/Measures

from teaching self-defence to potential victims of assault to bomb-proofing buildings against terrorists. In general the aim of target hardening is not to make objects completely resistant to attack, but to increase the risk of an attack to a level where the risk outweighs the gain of the crime as perceived by the offender. For example, by increasing the time it takes to overcome the measures.

Against forced entry	**Toughened glass, latticework or screens to cover windows, deadbolt, metal door, tamper-proof screws in fittings etc.**	 *Figure 14. Bullet-proof glass after a burglary attempt (Securipedia)*
Against destruction	Concrete or steel picnic tables, benches, bleachers, fire-retardant paint, slash-proof and steel-framed seats	
Against bombs	Stand-off zones where no unauthorized access is possible, increasing bomb resistance for vulnerable (parts of) objects, locating vulnerable structures	
Against toxins and air-borne agents	Detectors, closable air vents, filter systems, unreachable air intakes, emergency forced air circulation	
Against violence	Separating traffic flows of for instance pedestrians from motorized vehicles	
Hostile vehicle (or weapons attack) mitigation bench	Designing in target hardening furniture that can also serve as place to treat victims or hide behind for (possible) victims.	 *Figure 15. Hostile vehicle mitigation bench.*

Table 2. Target hardening equipment overview.

2.3.3   State-of-the-art technologies: Personal Protection Equipment

Finally, when an act is being carried out at the threat is imminent, Personal protective equipment (PPE) (equipment worn to minimize exposure to various hazards that cause injury and illness) can be used. In order to help first response teams to efficiently, safely and effectively response to emergency situations, it is, in addition to the awareness of implemented procedures, necessary to provide additional emergency equipment for the personnel managing the security of the public space. A well-designed, equipped and properly located package of equipment for first responders will significantly increase the effectiveness of emergency response actions. Personnel that is responsible for coordinating emergency actions should be familiar with its contents, location and trained in its use. Deliverable 3.4[87] of the ProSPeReS project will provide a detailed overview of different types of PPE and when and where to use which types. Examples of important PPE are listed in the figures below.

Figure 16. Anti-stabbing vest.   *Figure 17. Ballistic blanket.*   *Figure 18. Flame resistant clothing.*

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[87] PRoSPeReS project (2022). Deliverable 3.4. Preparing recommendations for equipment – monitoring, detection and protection.

3. Conclusion

This deliverable 3.1 of the ProSPeReS project has given an overview on the current state-of-the-art regarding the protection of public spaces against terrorist threats pre, during and after a (potential) attack. The description of the state-of-the-art has been divided into state-of-the-art standards, science and technologies. Regarding the **standards**, this deliverable has described the most commonly used guidelines regarding risk- and vulnerability assessment and the standards that can counter or prevent these risks by designing out crime in public space. Additionally, within this deliverable the standardised guidelines for the organisation and planning of the securitization of any event have been described. For a quick version of the risk- and vulnerability assessment process, the Secu4All project method is advised, which will be developed specifically for places of worship in D3.4 of the ProSPeReS project. The described state-of-the-art **scientific** theories and methods that can help to analyse and prevent terrorist attacks, have been described in the general context of (criminal) behaviour in public spaces. To be able to understand the human behaviour in public space, it is highly important to conduct research on environmental psychological and criminological aspects of geographic behaviour of humans. Why do they move in certain directions and why do they commit crimes in specific areas? If we can analyse these patterns, we can also start predicting them and thus prevent possible harm to public space. But most important, if we take away the suitability of a target and increase the capability of its guardian, a likely offender will not become a motivated offender. Last but not least, within this deliverable, an overview on the different types of innovative **technologies** has been described, that can help to assist in predicting these patterns or in any other way help to prevent terrorist attacks pre, during and after an attack and to detect the threats at a very early stage and can help to protect victims in case the threat occurs.

Appendix A – the Purple Guide; Chapters overview

This appendix gives an overview and description of the chapters that have been added to the UK's standardised event management guidelines; the Purple Guide[88].

1. Health and Safety legislation

- Health and safety law places duties on businesses involved in events to ensure the health and safety of their employees and the public;

- Further legislation relating to entertainment licensing, fire safety and safety at sports grounds applies to events and is signposted in The Purple Guide;

- Events run by volunteers (where no one is employed) are generally not covered by health and safety law, unless someone is in control of premises; [89]

- Enforcement of health and safety law at events is shared between the Health and Safety Executive (HSE) and local authorities;

- The maximum penalty for breach of Health and Safety Legislation is up to 2 years in prison and an unlimited fine;

- Enforcement of fire safety legislation generally rests with individual fire and rescue authorities. There are exceptions such as Sports Grounds, please ensure you liaise with your Fire Service who will be able identify this for you.

2. Planning, management and risk assessments

- Effective planning is central to putting on a safe event;

- Prepare an event safety plan;

- Have appropriate management arrangements in place to ensure the health and safety of employees and others, including volunteers and the public, during all stages of the event;

- Carry out a systematic assessment of the risks to employees, volunteers and the public;

- Implement risk control measures identified by the risk assessment;

- Put appropriate arrangements in place to monitor health and safety compliance;

- Provide competent health and safety advice;

- Liaise with other interested parties, including local authorities, stadium management, arena operators, safety advisory groups and the emergency services, early in the planning process;

- Thorough investigation of the site to be used;

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[88] Food, Events and Things (2022). *The Purple Guide to Health, Safety and Welfare at Music and Other Events*. EIF Ltd, Chepstow: UK. Retrieved on June 22nd 2022, URL: https://www.thepurpleguide.co.uk/index.php/the-purple-guide
[89] URL: www.gov.uk/government/news/can-do-guidance-will-makeorganising-volunteer-events-simpler

3. Venue and site design

- Carry out a site-suitability assessment early in the planning process;

- In that assessment, include the nature of the event, audience numbers and the infrastructure required;

- Design the site layout to minimise risk, for example to segregate pedestrians and vehicles;

- Prepare a site and area location plan;

- Establish emergency routes;

- Liaise with key stakeholders, such as landowners, the local authority, local emergency services, neighbouring businesses and local residents.

4. Contingency and emergency planning

- To emphasize the importance of having plans in place to effectively respond to disruptive influences, health and safety incidents and emergencies which might occur at, or impact upon an event;

- To recognize that with all but the smallest, low risk, event organisers will need to liaise with the emergency services, and other relevant agencies, to prepare appropriate emergency plans;

- To ensure that robust management arrangements are in place to implement these plans;

- To recognize that all involved with the management of events (including employees and volunteers) need to be trained in emergency procedures, be assigned to, and understand, their specific roles, should an incident or emergency occur;

- To be aware that the initial response to an emergency may be the responsibility of the event safety management;

- To recognize the importance of testing these plans in the most practicable way.

5. Medical

- Ensuring that there is an appropriate level of medical, first aid and ambulance provision at an event that will minimise the impact on local NHS services;

- Undertake a medical, ambulance and first-aid resource assessment;

- A medical staffing plan should be made prior to the event to ensure that staff are deployed appropriately;

- Medical provision should be provided for the full duration of the event, including build up and break down.

6. Communication

- Supply employees and others who might be affected by work activities with information on the risks to their health and safety;

- Provide staff and visitors information about what to do in an emergency;

- Ensure proper co-operation and co-ordination of all those working onsite. Effective

communication will help achieve these goals;

- Assess the communication requirements of all the organisations involved in the event, including handling routine health, safety and welfare information and communicating effectively in the event of an emergency.

7. Transport

- Site vehicles and traffic are a major cause of serious and fatal accidents;

- Assess the risks from vehicle movement onsite at the planning stage of the event and identify what measures are needed to control these risks;

- Prepare a traffic management plan for internal and, where necessary, external traffic control;

- Where reasonably practicable, segregate pedestrians and vehicles during all phases of the event;

- Have a traffic management system in place, incorporating one-way systems where possible;

- Ensure all drivers are authorised and trained to use relevant vehicles;

- Ensure all drivers are inducted to site-driving protocols;

- Minimise the need for reversing;

- Ensure drivers of work vehicles, banksmen/signallers and traffic marshals are trained and competent.

8. Working at height

- Falls from height are one of the main causes of workplace death and injury;

- Working at height means any work in any place where if there were no precautions in place, a person could fall a distance liable to cause personal injury;

- Employers should ensure all work at height that they control is properly planned and organised;

- Work at height should take into account weather conditions that could endanger health and safety;

- Risk-assess work at height and take steps to avoid, prevent or reduce risks of falls, liable to cause personal injury;

- Select the right access equipment for the job;

- Workers should be competent in the work to be done and in the use of the equipment provided;

- Ensure risks from fragile surfaces and falling objects are controlled;

- Have an emergency rescue procedure in place to recover anyone who may have fallen and is suspended, e.g. from a lanyard and harness system.

9. Temporary demountable structures

- The failure of any temporary demountable structure (TDS), no matter how small, could have devastating effects. The design, safe erection, use and deconstruction are important parts of event planning;

- Ensure the design meets the requirements of the structural concept, and the location onsite is appropriate, with a plan of how it will be built (and dismantled) safely;

- Seek guidance from people who are competent in these structures at an early stage in the planning process

- Ensure the structure is built to the agreed design;

- Safety-critical checkpoints should be identified in the build, and ensure checks are made by a competent person before work progresses to the next checkpoint;

- Undertake the work safely by having competent staff and a suitable onsite operational management system in place;

- Make sure there is an independent design check and management system for the control of changes to a TDS, e.g. clients attaching advertising material that affects wind loadings;

- Ensure there is a suitable maintenance and inspection regime for the completed structure, which will also require monitoring for the effects of wind and weather;

- Allocate adequate time and resources for each of the above stages.

10. Fire Safety

- Fire legislation requires a risk-management process that focuses on places and buildings;

- Carry out a fire-safety risk assessment, or engage the services of a competent person to do so;

- Consult and liaise with the local fire and rescue authority at the planning stage, and thereafter as required;

- Draw up a fire-management plan;

- Identify potential ignition and fuel sources;

- Establish the control measures;

- Have an evacuation plan in place;

- Implement and enforce appropriate process and general fire precautions at all stages of the event;

- Provide adequate means for raising the alarm, and suitable and sufficient escape routes;

- Provide suitable and sufficient fire-fighting equipment.

11. Electrical and wiring

- The advice given in this chapter is intended as an overview. Electrical contractors must consult the documents listed for specific guidance;

- The event risk assessment and the major incident plans should cover all possible hazards associated with the electrical and lighting installations;

- Equipment should be weatherproofed and isolated from the public;

- Cabling must be routed in a manner that will minimise tripping hazards and mechanical damage throughout the site;

- Consider the location of generators to enable refuelling and prevent excessive noise nuisance.

12. Barriers and fencing

- Choosing the correct barrier system or fencing is vital to ensure crowd safety. Understand the different types, their strengths and appropriate uses;

- Select a suitable supplier, who will be able to provide all the necessary drawings, plans and risk assessment;

- A barrier system must be built in the correct way to ensure it does not pose any risks to the general public.

13. Crowd management

- The preparation of a Crowd Management Plan is an essential part of the event management planning process. It should be prepared by a competent and qualified person who has the knowledge and experience necessary to identify crowd specific hazards and propose suitable measures to reduce risk. In some cases, specialists are appointed to direct and manage crowd safety, though this may not be suitable for all events;

- The Crowd Management Plan, the Event Management Plan and associated Risk Assessments should be dynamic, 'living, breathing' documents, prepared separately yet in tandem with each other. Additionally the relationships and communication between all parties involved in the planning process must be open, transparent and honest;

- The Crowd Management Plan will identify, eliminate and control hazards and risks related to the tasks required of security, stewards and other crowd management personnel. This is distinct from the overall event management plan which should focus on hazards and risks that might impact on those attending the event, including personnel, contractors and performers. In each case the appropriate risk assessment should be included;

- Crowd management should be considered as an essential element from the start of the event planning process to ensure that the correct design, information and management system is developed in tandem with the event plan.

14. Special effects

- The use of special and visual effects at an event must be properly planned;

- Risks associated with special effects should be assessed by a competent person and effective risk control measure implemented;

- Those involved in the planning, assembly and execution of special effects must be suitably trained and competent;

- Adequate time and resources must be provided to prepare and rehearse;

- Secure facilities must be made available for the assembly, fusing etc. of explosive effects before their use.

- Arrangements must be made in case of an emergency.

15. Amusements

- During the planning stage, consider the type of amusements and attractions that will be present at the event;

- Amusements and attractions may include fairgrounds, individual fairground rides, inflatable devices (e.g. bouncy castles), bungee jumping, fire-eaters, etc.;

- Carefully choose the location of attractions to ensure the ground is suitable (probably best left to the controller/lessee, along with the layout plan, if there are multiple devices) but communication between the two parties would be advised;

- Check there is proper access for emergency vehicles;

- Ensure the layout of attractions allows safe circulation of crowds;

- Clearly define responsibilities for managing health and safety;

- Event organisers should ensure that ride controllers inspect and maintain their equipment and comply with their duties as operators so that their rides can be run safely.

16. Waste management

- Failure to effectively manage waste at events presents direct and indirect risks to the health and safety of employees and those attending (especially combustible materials) during the event and take necessary measures to remove it;

- Plan for the storage, handling and transport of general waste and sewage;

- Event organisers should assess the risks associated with generation, storage, handling and transport of waste, and take appropriate precautions;

- Ensure that contractors appointed to handle, remove and dispose of waste are competent;

- Contractors should assess and manage the risks associated with their activities;

- Event organisers and contractors may have duties under environmental protection legislation enforced by the Environment Agency and Scottish Environment Protection Agency.

17. Noise

- The Control of Noise at Work Regulations 2005 apply to exposure of all employees and contractors to loud music at events;

- Although volunteers are not covered by the Noise at Work Regulations, s3 Health & Safety at Work Act does apply to them;

- The Health & Safety at Work etc. Act 1974 also applies to the exposure of the audience to loud music.

- The risks to employees and others at work from exposure to noise should be assessed;

- Exposure of employees and others to harmful noise levels should be reduced so far as is reasonably practical;

- All those with duties to control exposure to noise should communicate and co-operate with each other to manage the risk. Everyone working at events need to take personal responsibility for their own noise exposure and to take reasonable care not to damage their own hearing or that

of other people;

- There is a legal responsibility for personal hearing protection to be used in some areas if noise levels cannot be controlled at a safe level;

- Many noise control measures are simple and cost-effective;

- The audience can still enjoy the performance with these controls in place.

18. Sanitation

- Event organisers must provide suitable and sufficient sanitary and welfare facilities for workers at an event;

- Responsible organisers will provide appropriate sanitary and welfare facilities for the audience;

- Provision of welfare facilities for the audience has positive benefits in controlling health risks and contributing to audience wellbeing and behaviour;

- Licensing legislation enforced by Local Authorities may require provision of sanitary and welfare facilities for those attending.

19. Campsites

- Ensure an adequate provision of services for the entire duration of the camping event;

- Separation of the site into smaller areas will make it more manageable;

- Audience profile will help determine site density;

- Contingency plans should include providing shelter for campers whose tents are unusable due to adverse conditions or events;

- All aspects of fire safety and public health issues, as identified by the risk assessment, should be carefully considered.

20. Information and welfare

- Offering welfare services will help the event to run smoothly;

- Ensuring the audience is well informed will aid crowd management;

- Information can be provided via the event website, social media, leaflets, event ticket, a telephone hotline, information points, informed stewards, site maps, event programme, etc.

21. Food, drink and water provision

- Check local food and drink legislation, as there may be regional variations;

- Ensure provision of a wholesome water supply in sufficient quantities. Failure to do so may have significant consequences;

- Levels of hygiene and cleanliness should conform to guidelines and current legislation;

- Consider Public Liability and Product Liability Insurance in addition to Employers Liability Compulsory Insurance.

22. Safeguarding children and young people

- The key aim is to ensure that children attending an event are kept safe and free from harm;

- Event organisers should ensure they are familiar with local and national legislation and requirements;

- Prepare a missing and found child policy, arrange lost and found children's points, and consider providing a meeting point where teens can be collected by parents at the end of the event.

23. Animal Welfare

- Ensure best welfare practices are observed by considering the attendance of a veterinary surgeon at an agricultural show. The vet's role would be to focus on the prevention of infectious diseases, and to provide treatment in the event of accidents;

- A welfare plan should be drawn up to cover perceived risks that could occur;
  Include a map of the show site to aid staff, the vet, competitors, trade exhibitors and members of the public.

Appendix B – Checklist for the protection of public spaces (in case of emergency)

1 – Location & capacity	5 – Construction of PSOI	9 – Safety checklist
2 – Emergency exits	6 – Safety checklist	10 – Crisis management
3 – Alarm systems	7 – Crisis management	11 – Cooperation protocols
4 – Fire	8 – Crowd management	12 – Medical safety

Deliverable 3.3 of the ProSPeReS project will provide a guidebook including recommendations of procedures, equipment and templates to prevent, protect, detect, respond and mitigate the result of the terrorist attack. However, this deliverable describes the state-of-the-art regarding the protection of public spaces. The following checklist is used to ensure the safety of a public space. It states that the following topics should be considered when protecting public space pre, during and after a terrorist threat:

1) **Location and capacity**

2) **Emergency exits**

   One of the procedures will set out how evacuations and exits can be achieved in improvised ways like using ground floor windows to climb out to avoid secondary attacks that may be planned at emergency exit points. Another example will be evacuees dispersing away from the place of worship because it is safer than going to an assembly point which is a highly likely secondary attack target.

3) **Alarm systems**

4) **Fire**

   One of the negative consequences of a terrorist attack on church buildings, apart from the loss of human life, may be a fire resulting from arson or initiated by an explosion.

   In the traditional view, fire is a phenomenon classified as a threat to public safety. It must not be forgotten that, in addition to the intentional actions of the perpetrator, fire can be the result of, or have a strong connection to the negligence of the facility manager, incompetent handling of open fire by users of the facility, including the risk of its ignition, or the action of natural forces, such as lightning.

   Fire is a spontaneous, uncontrolled and dynamic oxidation process known as combustion, which takes place in a place and at a time not intended for that purpose. The exothermic combustion reaction takes place in flammable materials such as paper, wood, for example, under conditions that are conducive to its development, i.e. where three basic elements are met. These are an energetic stimulus (e.g. flame, electric spark, heat stream), a fuel (combustible material) and an oxidant, which is usually oxygen contained in atmospheric air. The simultaneous fulfilment of these three conditions creates an environment suitable for the initiation of a physico-chemical combustion reaction resulting in the formation of molecules with unpaired chemical bonds, called free radicals, allowing the fire phenomenon to maintain and

develop in a spontaneous and chain reaction.

The purpose of an automatic fire detection system is to detect a fire earliest possible and to give a signal to appropriate action[90] sound alarm in building, transition to the firefighting organization, passenger lifts/fire doors control, automatic triggering of extinguishing process, etc.

The scenario of actions depends on the number and type of components used in the building. These systems are not required by law in all sacred buildings. It does not exclude their installation in a limited extent.

Components[91]:

- *Fire alarm control panel*

- *Initiation devices*

- *Pull stations*

- *Smoke detectors*

- *Duct detectors*

- *Heat detectors*

- *Beam detectors*

- *Air aspirating or air sampling smoke detectors*

- *Water flow switches*

- *Tamper switches*

- *Notification devices*

- *Audible devices*

- *Strobes*

- *Strobes/Horns*

- *Dialers or communicators*

- *NAC power supplies*

    The control of cooperating devices is to prevent the spread of fire and ensure conditions for safe evacuation. Fire alarm systems can control the operation of devices, for example:

- *transmit information about the fire alarm to the fire brigade;*

- *activate the operation of fire protection devices, i.e. smoke exhaust systems, fire curtains, cut-off dampers, etc.;*

- *release or opening of the escape door;*

- *block the operation of devices the operation of which may cause additional hazards during a fire e.g. suspend mechanical ventilation, cut off the gas supply to the building, bring the elevators to the ground floor and immobilize them.*

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[90] British Standards (2008). *BS5839 Fire Detection and Fire Alarm Systems For buildings Part 1: Code of Practice for System Design, Installation, Commissioning and Maintenance.*

[91] Telgian (2022). *News, Press & Publications: Guide to Fire Alarm Systems.* Retrieved on May 24th, 2022. URL: https://www.telgian.com/fire-alarm-systems-guide/

In context of terrorist attacks, it should be taken into consideration that intentional fire alarm may open normally closed doors making possible to enter the building by escape doors. Also, activation of ventilation on escape routes (stair cases) gives opportunity to spread chemical or other agents to affect evacuees.

Such use of the fire alarm system requires a precise knowledge of the facility/building as well as a good knowledge of how the system works.

5) **Construction of the public space (including the building)**

6) **Safety checklist**

7) **Crisis management**

8) **Crowd management**

Effective and efficient evacuation is one of the key actions to be to be taken in the event of a sudden increase in a previously unidentified risks, in order to rescue endangered people participating in mass gatherings.

9) **Hurding**

10) **Procedures and training**

This will be part of Deliverable 3.3 and therefore will not be discussed in this document.

11) **Cooperation protocols**

12) **Medical safety**

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