

# Integration Of Safety And Security Aspects In EU Context: Comparative Analysis Of Legislative Frameworks

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## Abstract

Existing regulation in Italy and the Netherlands with regards to the protection of Seveso sites, the safety and security aspects thereof as well as their integration shows striking differences in spite of hazard and risk similarities. The paper provides an overview of the implementation of the most relevant legislative frameworks for safety and security regulation for industrial sites that are applicable to EU member states: the consecutive EU Seveso directives since the 1980s and the European Programme for critical infrastructure protection (EPCIP) regulation. The Italian and Dutch national governments have adopted and implemented these regulatory frameworks in national legislation in different ways. The same goes for Land Use Planning policy and Emergency and Disaster Planning and Response frameworks in Italy and the Netherlands and its implications for safety and security of Seveso sites. To assess the integration of safety and security regulation of industrial sites, we review the differences in Italy and the Netherlands and discuss the implications of similar and new risks, integration gaps between safety and security regulation, and differences between the countries regulatory and response approaches.

*Keywords:* regulation, safety, security, civil protection, industrial risk, domino effects

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## 1. Introduction

On the morning of 10 July 1976, a tetrachloro-dibenzodioxin (TCDD) toxic cloud accidentally released from an industrial site in Seveso (Lombardia, Italy) spread over the region. Citizens had to be evacuated, and while many children began to manifest symptoms of chloracne due to the circulation of the toxin, farmed poultry and domestic animals died. Several studies would later prove the long-term effects of human exposure to dioxin and its correlation with increased cancer rates (Consonni et al. 2008). However, the contamination also endangered flora and fauna for years to come.

The Seveso disaster represented a pivotal turning point in the legislative framework of the European Community as it paved the way for a communitarian response for the safeguard of citizens and their environment. The Seveso disaster did not only give rise to a supranational regulatory framework for industrial safety, it also—together with other incidents—inspired the EU council to adopt a solidarity clause in the Lisbon Treaty and it prompted the EU commission to build the Civil Protection Mechanism—organizational capacity coordinated by the EU to provide swift cooperation between EU members states in response to disasters on EU territory (Boin et al. 2013, p. 21).

At the EU level efforts to increase risk prevention and management (Seveso directives) and build capacity for crisis and disaster response continued on different paths. The early drivers to increase the EU role in civil protection moved from DG Environment to DG ECHO (European Community Humanitarian Aid Office) in 2008 (Boin et al. 2013, p. 29). Meanwhile, safety regulation with respect to hazardous industries and materials remained within the environmental and health domains. The move of crisis and disaster management responsibilities to DG ECHO consolidated the EU's response-orientation of civil protection as opposed to the more anticipatory orientation in the safety risk and environment regulation domain. In addition, and particularly in the wake of the terrorist attacks on September 11, 2001 in New York, EU security policy developed along yet

another trajectory, a stronghold of the foreign affairs, justice and defense policy domains. The increasing awareness of security threats inspired the European Programme for Critical Infrastructure Protection, which promotes the prevention, preparedness and response to terrorist attacks on energy and transport installations – which in turn have implications for Seveso sites and environmental risks.

Nearly fifty years after Seveso, a number of trends combined seem to increasingly necessitate a more integrated approach to safety and security to protect European citizens from hazards related to high risk industrial sites. First, threat agents and vulnerabilities are changing in the sense that advanced interconnectedness through cyber infrastructure, the rise of artificial intelligence, and the risks of hybrid warfare, create new and unforeseen contingencies in terms of security for high risk industries that work with hazardous materials and processes (Boin et al, 2013, p. 5). Second, security is mostly studied in the social sciences, while safety is predominantly studied in the natural sciences, engineering, and medicine (Van den Berg et al, 2021). With increased specialization of academic research and proliferation of academic output, the fields seem to have grown further apart. Yet what counts for citizens is protection, whether the source of the threat is unintentional (the domain of safety science) or intentional harm (security studies). We need to reintegrate core insights from these hitherto separate research fields to keep citizens and their societies safe.

When (cyber) attacks target high risk industries and security is breached in such a way that it leads to immediate harm to people living nearby industrial sites or transportations, so called domino-effects can occur. A security breach in a single high risk site can set off cascading effects, with leaks, spills, fires, explosions, and even meltdowns as a result. Therefore safety sciences need to heed attention to security risks. Casson et al. (2018) show in *Safety Science* the relevance of security-related events on chemical/process facilities, with 132 occurrences in EU in 1970-2018, of which more than half resulted in contamination of the environment. The chemical and process industries are not the only ones at risk, as the Russian missile attack on the Zaporizhzhya nuclear power plant in Ukraine showed. Not only could the disruption of the plant incur considerable damage to the energy provision and critical infrastructure of the country, but it can also have severe transboundary societal and environmental safety consequences (Greiman, 2023).

It is therefore imperative to review existing legislative frameworks and their implementation with regards to both safety and security of industrial sites, and compare different EU member states regarding, to see what lessons we can learn from their progress, differences and challenges. This paper aims to do exactly that and to discuss the implications thereof from an ‘all-hazards’ civil protection approach for industrial sites.

## **2. Materials and methods**

To address the research question, this study employed documents from governmental and public sources discussing the implementation of the Seveso directives, and other relevant legislation in Italy and the Netherlands, mostly retrieved from the internet. For example, governmental decrees, evaluations, publications and reports are publicly available, and the European Seveso legislation and other EU directives related to safety and security have been translated into law in both countries. Furthermore, available academic studies were used to find commonalities and differences between the two countries with respect to existing approaches and frameworks in relation to safety and security of industrial sites, complemented by a expert interviews to invite feedback on our preliminary findings. The study was part of a larger EU Life project, called ‘Securdomino’, funded by DG Environment under grant agreement number LIFE20/ENV/IT/000436. The review of existing legislative frameworks regarding was one of the project work packages.

## **3. Safety regulation**

The transposition of all Seveso Directives in Italy and the Netherlands followed two different institutional and strategic paths. Italy focused on the transposition of the Directives towards national and local authorities maintaining a top-down approach (Dir. 96/82/EC, art. 7; Mitchison et al, 1999). The top-down approach in transposing the Seveso directive, did not imply significant efforts from the Italian national government. In fact, the first Seveso directive mainly obligated the manufacturer of hazardous industrial sites to fulfill all necessary tasks in order to prevent accidents and to limit their effects. In particular, the manufacturer must provide the competent authorities with all the necessary information regarding its industrial activities and the substances involved and provide all information in case of a hazardous accident (Dir. 82/501/EC; Papadakis, 2000).

The Dutch government instead established a framework that created a cross-level synergy between local and national institutions, stakeholders and citizens that was then upgraded when European legislation dictated increased attention for safety risks and land-use planning policies. It implemented the Seveso I directive through BRZO (*Besluit Risico's Zware Ongevallen*), which stemmed from four different laws, and mandated the national Labour Inspectorate, local Fire Brigades and the regional Environmental Permit Authority to enforce the decree. This framework established a strong connection between different levels of governance (Swuste et al, 2017).

The Seveso II Directive of 1996 introduced land-use planning as a pivotal factor of risk management, to guarantee protection for residential areas, nature, and areas of public use (Dir. 96/82/EC). Seveso II also increased the management responsibilities for manufacturers to ensure on-site safety. Both lower-tier and upper-tier Seveso sites had to provide a mandatory Major Accidents Prevention Policy (MAPP) and upper tier (or most hazardous) Seveso sites had to provide an additional Safety Management Systems (SMS) policy (96/82/EC). Member States' public authorities became responsible for guaranteeing safety in spatial organization (Christou et al., 2006). Article 12 instructed Member States to enforce adequate land-use planning policies in order to mitigate the consequences of major accidents at hazardous industrial plants (Dir. 96/82/EC). Those goals implied strict control measures on the siting of new industries, modification of existing sites, as well as all land use and protection of those areas most exposed to hazardous risks in case of an accident (Dir. 96/82/EC, art. 12.1). Moreover, land-use planning must provide for adequate distance between new establishments and areas potentially exposed to hazards and implement additional safety measures for existing establishments. In order to do so, all competent authorities in the Member States must set up appropriate consultation procedures for the correct implementation of the provisions of Article 12.1 (Dir. 96/82/EC, art. 12.2) (Hauptmanns, 2005).

The implementation of the Seveso II directive required a significant effort for the Netherlands. In particular, the administrative burden required for the enforcement of the directive was going against the Dutch government's ambition to reduce administrative involvement in safety issues (Swuste et al, 2017). The transposition of land-use planning after Seveso II in the Netherlands relied on the regional Environmental Permit Authorities to check compliance with land-use planning policies (see BRZO 1999). Decentral authorities became together responsible for issuing permits to hazardous sites, taking into account not only external safety risk assessments, but also environmental protection regulation regarding pollution, noise, occupational hazards, and emergency response considerations (Bottelberghs, 2000, p. 61). The new Seveso II regulation was adopted through an updated BRZO (1999) decree, in combination with the External Safety Decree of 2004 and stipulations for land use planning through the Spatial Planning Act (SPA) and the Environmental Management Act (Basta et al., 2008, p. 73).

The Italian government mandated its Ministries of Environment, Interior, Health, Industry, Commerce and Crafts and the Unified Conference to jointly redact the guidelines for the Major Accidents Prevention Policy (MAPP) and the Safety Management System (SMS) requirements (D.Lgs 334/1999, art. 7, 12, 15). A specific decree (DM 9 maggio 2001) established the regional competence of land-use planning in relation to risk prevention. The twenty regions of Italy are the first administrative level of the Italian Republic, some equally large as the Netherlands in total. Municipalities must follow the indications of the regional guidelines of the technical document on risk (RIR) when planning urban development. The local implementation of directive D.Lgs 334/1999 required regions to adopt a multidisciplinary approach, and exposed deficiencies of the land-use planning policies at a local level (Demichela et al., 2014).

In the Netherlands, both the legislative basis and the organizational authorities for regulating external safety in combination with land use planning were more fragmented than in Italy. The fragmentation complicated the implementation of SMS (the risk assessment and safety rules for upper tier industries) and resulted in a growing dependency on decentral governance and inspections that were ineffective due to a lack of capacity and expertise of local and regional inspectorates (Voogd, 2004; Swuste et al, 2017; Lindhout et al., 2020). The division of responsibilities for internal (occupational, labor conditions) and external safety on hazardous sites in different legislations were implemented/overseen by different administrative bodies (Swuste et al, 2017). The Italian government, instead, enforced a law that foresaw the shared responsibility among different national Ministries for the top-down implementation guidelines of Safety Management Systems (D.Lgs 334/1999).

A series of accidents revealed the need to improve risk management enforcement and emergency plans in a broader sense. Improper land-use planning was identified as a crucial variable of risk assessment after for instance the Enschede (NL) disaster of 13 May 2000 and the Toulouse (FR) accident of 21 September 2001 (Voogd, 2004; Paltrinieri et al., 2012). Updated European legislation pertained to the access to information and the public participation in the decision-making process, especially regarding environmental and spatial issues (Hřebíček et al, 2009). Later, Directive 2012/18/EU issued by the European Parliament and the Council on 4 July 2012, introduced new provisions for the improvement of human safety and environmental protection.

Seveso III put concrete effort in creating a meaningful collaboration among governments, NGOs, civil society and stakeholders. The scope of Seveso III extended to the land-use planning strategy and decision process that increased engagement of both institutional and non-institutional stakeholders (Pey et al, 2013; Wilday et al., 2012). Following the principles of the UN Aarhus Convention and the EU Council Decision 2005/370/EC, the Seveso III directive ensured public access to environmental information, hence facilitating public involvement in the decision-making process (Dir. 2012/18/EU, Art. 15). The exchange of information, not only with the public but also with competent authorities, was emphasized repeatedly in Seveso III. The regulation assigned this obligation to the operators of the facilities/establishments, public authorities in EU member states and the Commission.

Moreover, the responsibilities of the operator expanded. The legislation (Dir. 2012/18/EU, Art. 8) required the industrial manufacturer or operator to develop an effective safety strategy through a constant risk analysis involving potential major accident scenarios and evaluating hazardous substances and the safety of storage facilities. This process must be carried out following consultations with the on-site staff. Furthermore, to also assess the risk of potential domino effects, the role of inspections as means to ensure compliance with the Seveso III Directive became more significant (Dir. 2012/18/EU, Artt. 9, 20; Alileche et al., 2015). Inspections served as valuable tools for verifying the condition of reliability of a facility's equipment, particularly concerning the risk associated to the aging of equipment (Vairo et al., 2018).

The implementation of the Seveso III Directive again differed in Italy and in the Netherlands because of the Dutch cross-level approach and the Italian top-down enforcement of the Directive. Whereas Italy lacked in coordination between national and local authorities in terms of application of the third Directive, the Netherlands benefited from the great legal effort in establishing the BRZO framework, which determined an integrated progress in the development of a national safety strategy (Rosen et al, 1999; Swuste et al, 2017).

The Italian government adopted the Seveso III directive with the Legislative Decree of 26 June 2015, no. 105 (D.Lgs 105/2015), which is currently in force. The Italian Ministry of Environment is responsible for guidance and coordination regarding the control of hazardous incidents and communicates with other Ministries, EU institutions and member states. The Environment Ministry must assess potential risks associated with hazardous materials upon the request of the operator/owner of the plant. It delegated this risk assessment to the Istituto Superiore per la Protezione Ambientale (ISPRA). The Ministries of Environment, Interior, Health and Economic Development then examine the ISPRA evaluation report. In the event of the identification of a hazardous substance, the Ministry of Environment informs the EU Commission and every four years it submits a detailed report regarding the compliance with Seveso III parameters (D.Lgs 105/2015, art. 5). The D.Lgs 105/2015 regulation mandated the Ministry of Interior to establish a Regional Technical Committee (CTR) for each region. The CTR, together with ISPRA, the fire brigades and the Department of Public Rescue and Civil Defense prepares the national inspection plan for higher threshold facilities. An external safety plan became mandatory for both upper tier and lower tier establishments and the operator/owner of the plant must share its plan with the Ministries of Interior and Environment, ISPRA, CTR and the Department of Civil Protection (D.Lgs 105/2015, Artt. 13, 19.3, 20.4, 21).

In the Netherlands, the revised 2015 BRZO decree established mandatory coordination between the Ministries of Infrastructure and Water Management (including the environment policy domain), Social Affairs and Employment (occupational safety), and Justice and Security (fire service, safety regions) (BRZO 2015, Art. 1). Given the concerns regarding the enforcement inefficacy of MAPP and SMS since BRZO 1999, the new BRZO decree focused more on prevention policy regarding industrial hazards (BRZO 2015, Art. 7-8). Operators became responsible for risk management associated with major accidents as well as for the protection of human health and environment against specific hazards connected to significant accidents (Van Rossem, 2012). Authorities needed to pay attention to potential domino effects, especially considering the proximity of non-Seveso industrial sites that could exacerbate the consequences of an accident (BRZO 2015, Art. 8). Site operators not only had to cooperate with the public, but also with other companies and with local and regional safety inspectorates and emergency management authorities in crafting disaster response strategies, in alignment with the Safety Regions Act (Lindhout et al., 2020).

The Seveso III Directive reiterated the importance of the implementation of a proper land-use planning. The Italian decree DM 9/05/2001 already identified two possible strategies for land-use planning, namely sequential processes and co-planning and cooperation. The former consisted in a bottom-up sequential identification process of competences, from the municipal to the provincial level, in order to establish general provisions at the provincial level, as well as location and regulation of municipal urban areas. The latter was conceived for a faster implementation of territorial plans for coordination and development of urban planning tools. The Prefect shall arrange the application of the external emergency plan and must inform (through the Major's office) the nearby residents potentially subjected to the consequences of an accident. Eventually, CTR and regions deal with respectively upper-tier and lower-tier establishment accidents (Demichela et al., 2014).

The Netherlands created a specific Environmental and Planning Act (*Omgevingswet* – ten years in the making, going into effect on January 1, 2024) to deal with spatial planning and environmental protection. The *Omgevingswet* reunites all the previous legislation about spatial planning and distributes competences to authorities, companies and citizens in a clearer way. The *Omgevingswet* identified so-called focus areas, namely the physical space around an establishment containing hazardous materials where the risk of accidents is high. In other words, when designing the environment in proximity of a BRZO establishment, municipalities have the duty to protect citizens from any possible risk by enabling specific protective measures, such as placing barriers or build collection channels for flammable liquids.

In sum, the implementation of the Seveso legal framework in Italy and in the Netherlands implied different outcomes in the two countries. Since the reception of Seveso I, Italy enforced a top-down approach that relied on technical guidelines for safety reports issued by the President of the Council (Prime Minister) (DPCM 31 marzo 1989; Laurent et al., 2021, p. 54). That approach revealed to be efficient in developing inspections strategies accordingly to MAPP and SMS, but it lacked specific regulatory texts for the local application of Seveso legislation. The competing national and local legal frameworks implied a concrete difficulty in implementing international directives, especially regarding land-use planning and environmental protection. The absence of clear guidelines for the positive enforcement of a collaboration between private and public authorities resulted in a loss of effectiveness in land-use planning activities (Rosen et al, 1999, p. 108).

The Dutch cross-sectoral collaboration between national and local authorities, resulted in an improved territorial control regarding land-use planning and environmental protection (Boersma et al. 2012; Van Trijp et al., 2019). In particular, the Safety Regions Act of 2010 fostered a clear division of competences among local authorities, thus enhancing efficiency when establishing safety policy plans. While in the implementation of the Seveso II Directive, the BRZO legislation on inspections was initially inadequate and did not satisfy the MAPP and SMS requirements (Lindhout et al., 2020), the BRZO 2015 (implementing Seveso III) solved the issue by making regulatory authorities jointly responsible for oversight rather than relying on safety reports by the site's operators or owners. Eventually, this approach fostered also stronger cooperation between public and private sectors on land-use planning policy.

#### **4. Security regulation**

The increased emphasis on prevention and mitigation of harmful effects of industrial accidents and risks for employees, residents, and also the natural environment, shifts regulatory attention from causes to consequences. The early Seveso regulation focused on causes at (private) industrial sites, the later Seveso directives implied more public responsibility for consequences: accident prevention and risk mitigation through land use planning. Since September 11, 2001, a new causal element entered the equation. Mass terrorist attacks using bombs, planes and vehicles to cause as much harm possible changed the threat perception of European governments. Combined with an increased orientation to consequences of risks in the safety field, terrorist attacks and security breaches confirmed the need for all-hazard approaches and protection of vital interests and critical infrastructures (Lindström et al, 2009).

The European Programme for Critical Infrastructure Protection (EPCIP), established in 2006, aimed to address threats with an all-hazard approach but a particular focus on terrorist threats. EPCIP aims to safeguard Critical Infrastructures (CI), namely systems, assets and facilities essential for the wellbeing of society, whose protection is crucial to avoid transnational harm between EU Member States. Electricity grids, drinking water provision, or telecom infrastructure can be National Critical Infrastructures (NCI) or European Critical Infrastructures (ECI) accordingly. The EU expanded the scope of EPCIP with the implementation of the Council Directive 2008/114/EC, to allocate responsibilities between EU Member States and the Commission in safeguarding European critical infrastructures, in compliance with the principles of proportionality, subsidiarity, complementarity and by enforcing dialogue with (private) stakeholders. The new directive also required a comprehensive risk assessment regarding critical infrastructures that evaluates technological, natural and terrorist threats.

The Italian government implemented the provisions of EPCIP by creating the Nucleo Interministeriale Situazione e Pianificazione (NISP), an inter-ministerial body jointly overseen by the Ministries of Economic Development and Infrastructures and Transportation (D.Lgs 61/2011). NISP became responsible for identifying and designating European Critical Infrastructures (ECIs), based on a cross-sector assessment of critical aspects such as the potential casualties, economic ramifications and societal impact of an accident. The NISP also became national point of contact with the Commission, assuming responsibility for coordinating the inter-ministerial directives related to additional protection criteria and for data on potential threats, risks and vulnerabilities. The NISP engages in bilateral discussions and potential agreements with EU and the Member States about the identification of ECIs and updating of cross-sector assessment criteria. Moreover, their responsibility includes liaising with national Ministries—such as Interior, Defence, Economic Development, Infrastructure—, and the Departments of Civil Protection and of Information and Security. Legislative Decree 61/2011 also stipulated the appointment of a designated person responsible for the local protection (a role for the Prefect) and the requirement of a Piano di Sicurezza dell'Operatore (PSO). The PSO is a specific security plan developed by owners and/or operators of ECIs that must be based on a risk assessment compliant to the guidelines of the Legislative Decree.

The Dutch government embraced an all-hazard approach when dealing with ECIs. Following parliamentary requests in the aftermath of the 9/11 terrorist attacks (Motie Wijn, 2001), the Ministry of Interior released a Critical Infrastructures Protection Policy in 2005. This policy comprehensively addresses the safeguarding of Dutch critical infrastructures in relation to all hazards including terrorism. Infrastructures are critical when discontinuity in their functioning causes loss of human life, or economic or societal disruption at a national or international scale, and no feasible alternatives are available in the meantime (Reniers & Dupont, 2010; Dutch Ministry of Interior, 16 September 2005). Numerous Dutch ministries became involved in the cross-sectoral evaluation of potential vulnerabilities and in the identification critical infrastructures. They collectively engaged in national risk assessment taking into account the risks connected to critical infrastructures. This assessment includes twelve vital sectors, namely Energy, Telecommunication and ICT, Drinking Water provision, Food, Healthcare, Finance, Surface water, Public Order, Law and Order, Public Service provision, Transportation, Chemical and Nuclear industry (Dutch Ministry of Interior, 2005). The critical infrastructures, often privately owned and operated, are responsible for conducting their own vulnerability and risk assessment. However, they are required to collaborate closely with the respective Ministries to ensure public-private collaboration in risk management. Private sector entities must annually report their vulnerability and risk assessment and their progress in implementing protective measures to prevent possible disruptions due to human errors, excessive demands, extraordinary events, or deliberate attacks or sabotages.

The differences between Italy and the Netherlands in the implementation of the Directive 2008/114/EC do not just result from their respective legislative framework. The identification of critical infrastructures must follow cross-cutting criteria that include the evaluation of three parameters, namely casualties, economic damage and public effects (Dir. 2008/114/EC, art. 3). Even though both countries followed the provisions of the Directive, they enforce different strategies in their approach to protection.

The Dutch approach goes beyond the implementation of the EU Directive 2008/114/EC, integrating safety and security by raising awareness and attention to the interdependencies between critical infrastructures and vital sectors of society (Reniers & Dupont, 2010). The enforcement of the all-hazard approach of the Netherlands has benefitted from the already existing collaboration between public and private authorities. The identification of vulnerabilities in vital sectors is demanded from the relevant Ministry, while the risk assessment procedure is entrusted to the (private) owners or operators of the infrastructures. The Dutch government followed a consequence-oriented approach when identifying critical infrastructures, which focuses on the protection of vital interests (Cavallini et al., 2014, p. 232).

Italy lacks an all-hazard approach and delegates the identification of critical infrastructures to NISP instead of creating a synergy between each Ministry and their area of competence and identifying the vital sectors to be protected. Italy followed a cause-oriented approach when implementing the Directive 2008/114/EC, emphasizing the decision-making power of owners and operators in developing the security plans for the establishments (Cavallini et al., 2014). The absence of an integrated national security strategy mirrors the complex legislative framework of the country, which results in a weak collaboration between public and private sector in security management (Rosen et al, 1999). As a matter of fact, the absence of a synergy between public and private security competences becomes clear when examining the Unified Text on Public Security Laws (TULPS), that entrusts private security services in executing subsidiary security functions and focuses on training rather than on developing common security goals between public and private sectors (DM 629/2010, art. 2).

## 5. Emergency response and civil protection

Not only did the orientation shift from causes to consequences result in more emphasis on an all hazard approach and integration of safety and security risk assessment. Also, we witness the expansion of regulation and competences driven by EU directives: 1) from on-site risk management for high probability, low/local impact events and industry related risks (Seveso I); 2) to land use planning implications considering medium probability, external (medium) impact (Seveso II) on both the civil and the natural environment; 3) to ultimately providing security and safety regarding low probability, high impact events which involves emergency planning, public communication, cooperation and involvement of citizens and civil society (Seveso III and EPCIP). This is where crisis or emergency response and civil protection come into play.

The Dutch Safety Regions Act came into force in 2010 as a tool for the regional development of disaster and crisis preparation and response policies. Prevention and response capacity was historically organized at the local, municipal level but a series of high impact incidents in the early 2000s raised awareness that more centralization and an increased scale of operations and resources were necessary (Boin, Kuipers and Wolbers, forthcoming). Instead of over 400 municipalities and their fire services at the time, 25 safety regions became responsible for organizing civil protection and emergency preparedness and response. The safety region's management board includes all mayors of the region, the police chief, the director of public health, the chairperson of water board, the chief public prosecutor, and the governor of the province. The chair of the safety region is the mayor of the largest municipality. The management board responsibilities include the provision and organization of crisis preparedness and response capabilities, and they must provide guidance to execution by municipalities, fire service and medical assistance. Cooperation among fire brigades and municipalities is important for the safety regions ability to prevent and mitigate accidents. Fire brigades have prevention, inspection and response duties whereas municipalities are ultimately responsible for providing and overseeing safety region capacity and they issue permits and policies for land use planning in relation to risks and their consequences. Police are organized separately, but the mayors are responsible and in charge of the police for maintaining public order. The mayors' combined responsibilities for safety and public order bestow them with political-executive authority for both the safety region and the police operations. Safety regions must create a policy plan regarding the operational crisis management performance in the region. This plan must be reviewed every four years, to adapt specific policy plans based on an updated risk profile (Boersma et al., 2012; Van Trijp et al., 2019). The policy plans are important government risk prevention tools and basis for preparation and capacity building of fire brigades and emergency medical services.

The Italian National Service for Civil Protection (SNPC) was established with the Law 24 February 1992, no. 255 and then improved with the Legislative Decree 2 January 2018, no. 1. It is represented at all national levels of government, including the national government, regions, provinces, municipalities, mountain communities, that work together with public bodies, scientific experts and private institutions and organisations (D.Lgs 1/18, artt. 3-4, 6). The activities of the SNPC deal with assessment, prevention and mitigation of risks. The operational structures of the SNPC include the National Fire Department, parts of the Armed Forces, the State Forestry Corps, national scientific research centres, the National Institute of Geophysics and Vulcanology, the Italian Red Cross, the National Health Service, the National Alpine Rescue and voluntary organisations (D.Lgs 1/18, artt. 10-11). The SNPC's duties are risk prevention, search and rescue (SAR), and mitigation of emergency situations provoked by natural calamities that can afflict human activities.

The Department of Civil Protection (DPC), established with the Presidential Decree of 13 February 1990, no. 112, has to ensure the proper functioning of SNPC. The DPC is subjected to the authority of the President of the Council of Ministers, and it oversees and coordinates the SNPC. It also guarantees the unity of national representation internationally. The DPC's functions in prevention policies are limited to public structures and infrastructures (D.Lgs 1/18, art. 22). Moreover, the DPC is an actual tool of the President of the Council for the implementation of national emergency response plans in accordance to each risk scenario, the preparation and coordination of operations and the national rescue programmes. Hence, civil protection to natural hazards and disasters represents another top-down dimension in the Italian safety and security domain.

Through progressive EU legislation, the existing responsibilities for civil protection are increasingly coupled to risk prevention and disaster mitigation related to high-risk industries (due to both regulation on external safety risks and security threats to critical infrastructures) in light of the overall aim to enhance public safety. Cascading, or 'domino'-risks may necessitate more integration of perspectives and competences.

## 6. Discussion and conclusion

Italy and the Netherlands both adopted extensive safety regulations and carefully followed the provisions of the Seveso legislation. The main difference is that the Dutch legislative and organizational landscape started in a more fragmented and decentralized way than the Italian governance arrangement for Seveso implementation. In the end, the new Dutch *Omgevingswet* provides an increasingly integrated framework for the implementation of land-use planning policies in line with Seveso II and III. However, the Seveso legislative framework was exclusively focused on safety issues, and did not include security assessment and the management of systemic risks.

The implementation of Directive 2008/114/EC (EPCIP) in Italy and in the Netherlands prove how the two countries adopted different strategies towards security. The Netherlands empowered an all-hazard approach at the national level, fostering the identification of critical infrastructures in vital sectors for the wellbeing of population, environment and economy that are overseen jointly by private owners and operators and the Ministries of the Dutch government. The Italian government opted for a segregated focus on security threats with an interministerial body monitoring critical infrastructures while delegating the responsibility for internal and external security plans to private owners and operators of critical infrastructures. Italy has no strong mechanisms for public-private cooperation, nor a national strategy based on an all-hazard approach.

In another segregated policy domain, Italy also has a top-down approach for emergency and disaster response. The SNPC and the Department of Civil Protection (DPC) are coordinated by the Presidency of the Council of Ministers, demonstrating the highly hierarchical decision-making on emergency response. The Italian emergency response mechanism is based on a top-down intervention model that foresees the appointment of the actors at all levels involved according to their roles and legal responsibilities. The preparedness and intervention modes are strictly connected to the predictability of the dangerous event. The national DPC instructs on the intervention by assessing the level of risk in the affected area and provides specific administrative capacity for the emergency response through lower levels for rescue operations. The SNPC focuses on natural hazard-induced disasters, but can be asked to participate in an emergency response following for instance an industrial incident (SNPC 2018).

In the Dutch governance arrangement, crisis and disaster response is less segregated from safety risk management. The fire services—together with environment, land use planning and occupational safety authorities responsible for permits and inspections of Seveso sites—are part of the safety region capacity. The Netherlands combined a historical bottom-up tradition (local authorities first in command) with a cross-sectoral approach in developing emergency and disaster response. Through the Safety Regions Act, the Dutch government confirmed essentially the importance of cooperation between first responders such as police, fire service and emergency medical services and their bottom-up escalation procedure for deciding the appropriate level of emergency response coordination. This escalation procedure (called GRIP) means basically that first responders coordinate among their disciplines at the incident scene (situational mandate), and then escalate the coordination and decision authority to central levels up the hierarchy in case the incident has local, regional, transregional or even national implications—depending on the type and size of the incident.

Due to the principle of subsidiarity and national regulations about the transposition of laws, the adaptation of the EU legislation can differ between member states since institutionalized norms, bodies and strategies influence the transposition process (Steunenberg et al. 2010). The cases of Italy and the Netherlands highlight the different implementations of safety and security directives in their domestic legislative framework.

In Italy, regulation has not integrated safety and security but focused on implementation of a domain-specific risk-oriented strategy of intervention through a top-down approach. Specific vulnerabilities of the Italian territory were in fact pivotal in risk management, especially regarding the implementation of safety measures. Nature-induced disasters historically forged the institutionalization of strategies for risk prevention, intervention and mitigation. The frequency of seismic and hydrogeological phenomena became driving forces for the development of a safety strategy dedicated to the protection of citizens, environment and cultural heritage. The establishment of the Department of Civil Protection and its gradual advancement seem fostered by the need to prevent and mitigate natural-hazard disasters. Italy adopted a risk-oriented strategy based on a deterministic approach which has been tailored on the physical specificities of its territory. Hazards from a non-physical environment (security risks) are not subjected to a national risk assessment and management policy, nor integrated in emergency and disaster response planning.



Meanwhile, Dutch authorities consolidated a bottom-up all-hazard approach that fosters the integration of safety and security. Due to its high population density and its engineering approach to dealing with flood risks (though the construction of massive coastal and inland flood control infrastructures), the Dutch historically adopted a probabilistic approach to safety risks. The increasing awareness of both security threats and industrial safety risks further drove the horizontal cooperation between first response organizations and the progressive regionalisation of emergency services. The Safety Regions Act empowered a regional system of coordinated response in safety and security matters, with specific local policy plans for municipal crisis management based on both safety and security risk profiling (Van Trijp et al., 2019). With previously fragmentary legislation and mandates now being replaced by framework legislation such as the Safety Regions Act of 2010 and the Omgevingswet of 2024, the Dutch risk and crisis management approach represents a relatively strong interconnection between high-risk industries, territories, citizens and public services.

In recent years, the EU policy approach of risk assessment and risk management has been influenced by the emergence of global threats and emergencies, pointing at a growing interdependency between safety and security matters. The Covid-19 pandemic further paved the way for the communitarian shift towards an all-hazard approach to risks and threats, as stated in EU Directive 2022/2557. The integration of safety and security through the implementation of an all-hazard approach, can be decisive in improving risk assessment and emergency management. The differences between Italy and the Netherlands can be traced back to their geography, as well as to the impact of disasters and the historical developments that have produced institutionalized responses. Nonetheless, EU Directive 2022/2557 will require an integrated safety and security approach, and a profound rethinking of strategies in EU member states. This comparative study on how the drivers of safety and security policy are implemented differently and to what effect in two member states, can help to gain insight into possible pathways towards a more integrated approach.

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