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# Reducing Seismic Vulnerability of Historic Areas: Moving from Good Practices to Tailored Roadmaps

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**Abstract:** Enhancing territorial resilience while reducing risks is of paramount importance for communities, especially for those in historic areas where vulnerability is a significant component of risk, and where cultural heritage serves as a catalyst for collective identity. However, policies and planning tools designed to protect historic areas from natural and anthropic risks remain fragmented. The aim of this paper is to provide evidence-based guidance to help policymakers build tailored roadmaps for reducing the seismic vulnerability of historic areas. This research focuses on the Adriatic–Ionian region, with six countries identified as case studies. The methodology is structured in three phases. First, good practices for addressing seismic vulnerability are identified and codified to improve existing knowledge. Second, a replicability and scalability assessment of the good practices is performed for each case study. Finally, roadmaps are developed as ready-to-use tools to support the implementation of measures to reduce seismic vulnerability. Although the results reveal considerable variability in the readiness levels of the six case studies to act for reducing seismic vulnerability, the overall methodology effectively supports policymakers in moving from good practice selection to tailored roadmaps for enhancing resilience.

**Keywords:** seismic risk; seismic vulnerability; disaster risk reduction; territorial resilience; historic area; good practice; roadmap; Adriatic–Ionian region; EU-funded project



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## 1. Introduction

Reducing the seismic vulnerability and exposure of historic areas is an urgent global challenge. It deals with reducing human casualties and economic losses while preserving the inestimable cultural heritage of historical city centers and their ability to serve as fundamental elements for supporting the local identity of communities.

As highlighted by Triller et al. [1], there is a lack of systematic coordination and synergy both among countries and regions sharing similar risks and among different typologies of policy instruments addressing seismic risk reduction within the same country. This gap needs to be faced to enable policymakers to identify the most appropriate provisions and tools to reduce the seismic risk of large territorial areas such as the Adriatic–Ionian area. Indeed, this region is heavily subject to natural hazards, and according to the Seismotectonic and Seismic Hazard Assessment of the Mediterranean Basin (SESAME project), the western part of Greece, the area of Crete, the central parts of Italy, and the Adriatic Sea are the most seismic-prone areas of Europe [2]. Peak ground accelerations for these areas are estimated

to reach up to 1 g, indicating the high seismic vulnerability and the large impact of future earthquakes in these areas. The main reason for this risk is the presence of a major plate boundary, that between the African and Eurasian lithospheric plates, which runs across the southern coast of Crete, the western coasts of the Ionian islands in Greece, and the peri-Adriatic margins, and along the eastern Apennine mountains in Italy. The highest convergence rate between these two lithospheric plates has been estimated in southern Greece at about 4.5 cm per year [3].

The Adriatic–Ionian region is extremely rich in terms of cultural and natural heritage, both tangible and intangible. The abundance of cultural resources and the acknowledgement of common features and problems in the role played by heritage in the development of territorial identities have been directing EU institutions' attention to the opportunity of developing common processes of heritage-led regeneration [4]. Enhancing the cultural heritage in the region contributes to the quality of life and rehabilitation of cities, and, especially, public spaces. Similarly to Obad Šćitaroci et al. [5], this research does not focus on the cultural heritage examples of exceptional value, but on the ordinary heritage that is prevalent in all settlements and landscapes and does not necessarily have universal global or national value, but is extremely important for the local communities.

Countries in this area currently undertake different approaches in tackling urban vulnerability reduction, the planning and management of emergencies after seismic events, and the post-earthquake phase that concerns the reconstruction and seismic adaptation of damaged buildings. While the importance of defining targeted policies and specific actions taking into consideration the different risk embedded in diverse areas—as well as the diversity of the community's needs—is well-recognized [6], a better cooperation in all the disaster risk management phases, and especially the prevention one, is expected to produce significant improvements in facing seismic vulnerability reduction in the considered area [7].

In recent years, disaster risk reduction in historic areas has been strictly related to urban resilience, which assumes a key role worldwide in pushing forward vulnerability reduction [8]. In the international scientific debate, resilience is considered an umbrella concept that embraces different fields, where urban planning and disaster risk reduction are among the implementing fields [9–11]. More specifically, urban resilience necessitates a transformative approach that must be embedded in urban policies and tools for making cities resilient [11]. Research should focus more and more on how to combine typical earthquake engineering procedures at the building scale with urban planning systems [12], therefore moving from the assessment of seismic vulnerability at the building scale to the urban one [13].

As theorized by Veselý [14], one way to improve public organizations is to identify, communicate, and facilitate the transfer of practices that seem to work successfully somewhere else. Therefore, as highlighted by a number of scholars, enhancing the adaptive governance system [15,16] and capitalizing on and sharing current good practices in the field of resilience of historic areas [17] is believed to have a key role in empowering the public authorities to act for reducing disaster risk and managing it while promoting policy coherence and aligning planning instruments [18]. Urban resilience is a driver capable of steering the urban policies and agenda of institutions [19] for preventing, mitigating, and reducing risk. However, there is a lack of evidence on how to move from good practices learnt by others to tailored roadmaps toward resilience, where priorities of intervention and measures are identified.

The research addresses this gap through the following main research question: how to develop and test a methodology to support policymakers in moving from the identification of suitable good practices to the tailoring of roadmaps that detail and prioritize the steps

needed to reduce seismic vulnerability? The research focuses on the Adriatic–Ionian region, where the ADRISEISMIC project was developed. Funded in 2020 by the INTERREG V-B Adriatic-Ionian ADRION Programme 2014–2020 and lasting three years, the ADRISEISMIC project aimed at sharing current effective approaches already developed within the partner countries (i.e., Albania, Croatia, Greece, Italy, Serbia, and Slovenia) in the field of policies and norms, methods, and techniques for the expeditious assessment of seismic vulnerability and seismic retrofitting. These were mainstreamed within the partners by tailoring the methods and solutions to the local contexts, through the action plans and by defining common training schemes. The main focus area was the historical urban center, conceived as a symbol of local identity and socio-economic core for all the Adriatic–Ionian settlements. Each partner country was responsible for establishing a case study to support the project activities.

The project activities described in [1] set the ground for the conceptual framework of this paper. The collected norms and incentives in force in the six case studies are assessed and systematized according to six categories (i.e., seismic norms, building regulations, urban planning regulations, seismic incentive frameworks, post-earthquake planning, and insurance against earthquakes) in order to support the identification of good practices. Afterwards, the replicability and scalability potential of the good practices are assessed. As the ultimate result, six roadmaps are developed and detailed, one for each case-study part of the ADRISEISMIC project, tailored to their contexts, needs, and expectations. The roadmaps describe the way the regulatory framework will be endorsed to address the common challenge of seismic vulnerability reduction.

Following this introduction, Section 2, describes the three phases in which the methodology is articulated, and the local workshops that were organized to validate the results and ensure the applicability of the research methodology at the local level. The findings are presented in Section 3, where they are reported according to the methodological phases and steps. In Section 4, the results are discussed by country. Conclusions are drawn in Section 5.

## 2. Materials and Methods

As argued by Triller et al. [1], 75 documents collected from six partner countries—Albania, Croatia, Greece, Italy, Serbia, and Slovenia—laid the foundation for a harmonized, cross-border approach to managing seismic risk. The documents belong to six significant topics, namely seismic norms, building regulation, urban planning regulation, seismic incentive frameworks, post-earthquake planning, and insurance against seismic risk. All documents at the national level covering the above-mentioned topics were included for each partner country, while for sub-national levels, specific geographic contexts were selected for the analysis. In case legislative competences or tools are developed at the regional or municipal level, only the most representative regions or municipalities were included. This is especially relevant for the urban planning topic, since it is a subject legislated at the regional level in Italy. In this case, policy instruments in force in the Emilia-Romagna region were considered, where the ADRISEISMIC project activities took place. In addition, if municipalities have the responsibility of drafting the urban planning tools, these were narrowed down according to the capital city of the region (e.g., the Bologna Municipality in the Emilia-Romagna region for Italy) or by considering the ones directly involved as partners in the project (e.g., the Municipality of Gjirokaster in Albania).

To establish a common reference framework concerning regulatory, operational, and economic–financial instruments of seismic vulnerability and its reduction in the Adriatic–Ionian area, the harmonization of the different instruments and approaches is required.

Starting from the comparison matrix resulting from [1], a three-phase methodology was developed (Figure 1).

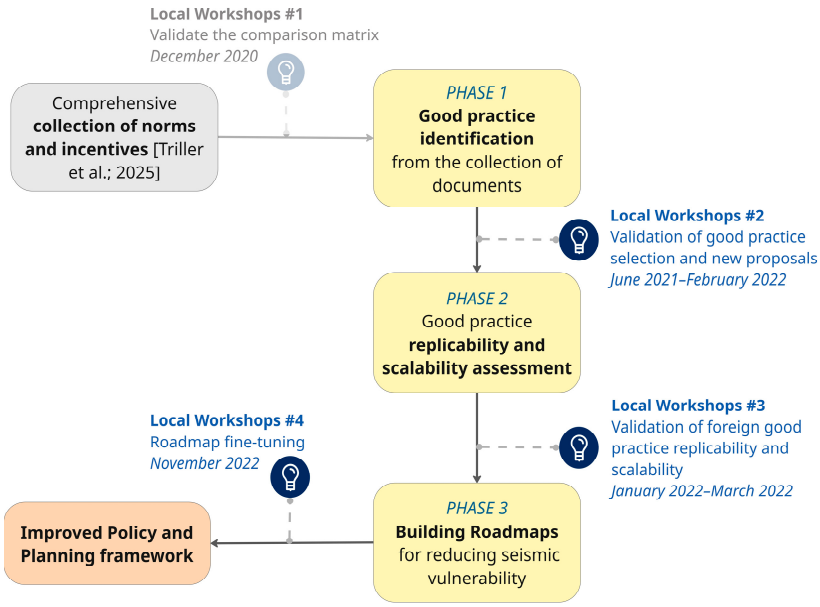


**Figure 1.** Overview of the methodological framework, including the main phases and workshops to validate the outcomes of each phase [1].

The methodology started with the identification of good practices (GPs) within the regulatory tools and incentives of the six involved countries (phase 1). Once the collection of GPs was concluded, the six case studies were asked to assess the potential of replicability and scalability of the foreign GPs in their countries, in order to highlight the barriers and obstacles to the implementation in the local contexts (phase 2). Finally, the GPs served to build a tailored roadmap for each case study, which is considered a step-by-step strategic tool aiming at improving the policy and planning framework to strengthen local responses and reduce seismic vulnerability at the urban scale (phase 3).

The outcomes of the three phases (e.g., identification of GPs, assessment of GPs in terms of replicability and scalability, roadmaps) were validated through a series of local workshops organized by each case study. The involvement of local stakeholders in each step of the methodology allowed for building a solid and shared framework that represented the starting point for the following steps. After a first round of online workshops organized by each case study in December 2020 to present the project and assess the completeness of the collection of norms and incentives [1], stakeholders contributed to the discussion about the identification of the most promising GPs currently in use in terms of innovation contents or procedures and transferability and replicability to other contexts. This second round of workshops occurred in the timeframe June 2021–February 2022. During the third round of workshops (January–March 2022), local stakeholders rated the potential of scalability and replicability of those GPs identified in other partners' countries, aiming at identifying the barriers to and the opportunities for tailoring them to the local contexts. Finally, the structures of the roadmaps, with their phases and their specific contents, were presented to the key stakeholders and validated during the fourth and last round of workshops, organized in November 2022.

In terms of data sources, as mentioned, the research is based on the collection of 75 documents gathered and analyzed by the project partners, which laid the foundation for the steps of the presented methodology. Indeed, the identification of good practices is based on the deep analysis of the 75 documents, while both the replicability and scalability

assessment and, finally, the roadmaps are based on data provided by the project partners and tailored during the local workshops with the stakeholders.

### *2.1. Phase 1: Methodology for Good Practice Identification and Description*

GPs were identified within the regulatory and normative frameworks of the countries. GPs included all policy instruments that significantly contribute to seismic vulnerability reduction, representing virtuous initiatives with the potential of being replicated across the Adriatic–Ionian region. Criteria for their identification also vary according to the topic under investigation (i.e., seismic norms, building regulation, urban planning regulation, seismic incentive frameworks, post-earthquake planning, and insurance against seismic risk). Whether the document embeds specific provisions on cultural heritage was also assessed.

Under the seismic norm topic, all regulations and other existing documentation dealing with the design of new structures and the assessment of existing ones, taking into account their seismic resistance, were collected. A GP under this topic is one that shows some potential regarding the following: covering different aspects of seismic vulnerability reduction (e.g., the design of new structures, assessment of existing structures, and retrofitting interventions); specifically targeting cultural heritage buildings; introducing procedural simplification to deal with seismic assessment and retrofitting process. Building regulations include all the documents providing general rules for the construction of new buildings, together with the procedures that can be applied to the transformation of the building stock. In this context, a procedure, an exemplary tool, or a virtuous practice for seismic vulnerability reduction at the urban scale was considered a GP. Urban planning regulation includes both urban planning laws and urban plans. GPs are ones that embed ad hoc procedures or methodologies to assess and reduce seismic vulnerability at the urban scale. When considering the seismic incentive framework, both economic and volumetric incentives represent an important instrument to reduce seismic vulnerability, especially if combined with informative campaigns aiming at raising awareness of seismic safety. Therefore, in terms of GP selection, the ones further analyzed are those that appear to be the most effective and have a direct impact on minimizing seismic vulnerability and risk at a national level. In terms of post-earthquake planning, the collected documents cover the initiatives related to the optimization of the seismic response and support the awareness of various stakeholders about possible scenarios in the event of an earthquake. The criteria adopted for the identification of GPs are, firstly, based on the presence of a holistic plan for the organization of the post-earthquake situation, thus covering most actors at national, regional, and local levels. Also important was the possibility of being expanded or applied to cultural heritage. Finally, regarding seismic insurance, none of the participating partner countries has compulsory insurance or regulations. All case studies, however, collected heterogeneous data on voluntary earthquake insurance, which differ from country to country.

Each GP was described using a factsheet, which includes the following information:

- Practice name: what the GP deals with;
- Main objectives;
- Detailed description: the content of the document is described in more detail (i.e., maximum 100 words);
- Status: information about the validity of the GP (i.e., ongoing, completed);
- Target groups: specific segments of the population that are interested in the GP (i.e., public authorities, sectorial agencies, education/training, professional fields, general public);

- Reference to cultural heritage: whether the document, in any of its parts, explicitly mentions the cultural heritage or refers to it;
- SWOT analysis: a framework for identifying strengths, weaknesses, opportunities, and threats of the GP;
- Country: where the GP is adopted;
- Reference documents: reference to the documents included in the comparison matrix [1];
- Territorial scale: level at which the GP is in force (i.e., national/regional/municipal);
- Promoter: entity responsible for the adoption of the GP.

### *2.2. Phase 2: Materials and Methods for Good Practice Replicability and Scalability Assessment*

Once the collection of GPs was concluded, the six case studies were asked to evaluate the potential for replicability and scalability of the foreign GPs in their territory, and to select the administrative level at which the practice could be implemented, according to the specificities of their planning and regulatory system. Scores were given according to two parameters:

- The potential of replicability of the practice, which expresses the possibility to implement the GP in their territory, by also considering any modifications or barriers required. The rating system ranges from 1 to 3*, where "1" means the replication is considered not possible at all; "2" corresponds to a possible replication; "3" is associated with a very likely probability of replication; and "3*" is assigned in a case in which the potential of replicability is very likely, as, indeed, a very similar practice is already in place;
- The potential of scalability, which expresses the scalability of the GP within the case study from 1 to 3. When assessing the potential of scalability of a GP available at the municipal level, the potential of application at the national level should be rated with "1" if not possible or "2" if possible, but the regional scale seems also appropriate, while "3" is assigned if the document is already applied at the national level, and this is considered the most suitable scale of application.

For both of the parameters of replicability and scalability, a brief explanation of the decision for such rating is required, to collect information about the possible obstacles and barriers. The information about the potential for replicability and scalability provided the basis for drafting the ADRISEISMIC roadmaps, which are explained in detail in phase 3.

### *2.3. Phase 3: Materials and Methods for Roadmap Design and Development*

The aim of the roadmap is to support decision-makers and stakeholders by exploring their knowledge and methods to reduce seismic vulnerability, informing them about the adoption of tested and verified GPs, and helping them with implementation and monitoring. The ADRISEISMIC roadmap is a practical, ready-to-use tool structured in 5 steps (see Figure 2):

1. Identification of the gaps in the current policy and planning framework;
2. Identification of barriers that prevent the improvement of the policy framework;
3. Identification of the solutions to improve resilience;
4. Identification of responsible entities, stakeholders, and funds;
5. Selection of the monitoring strategies.

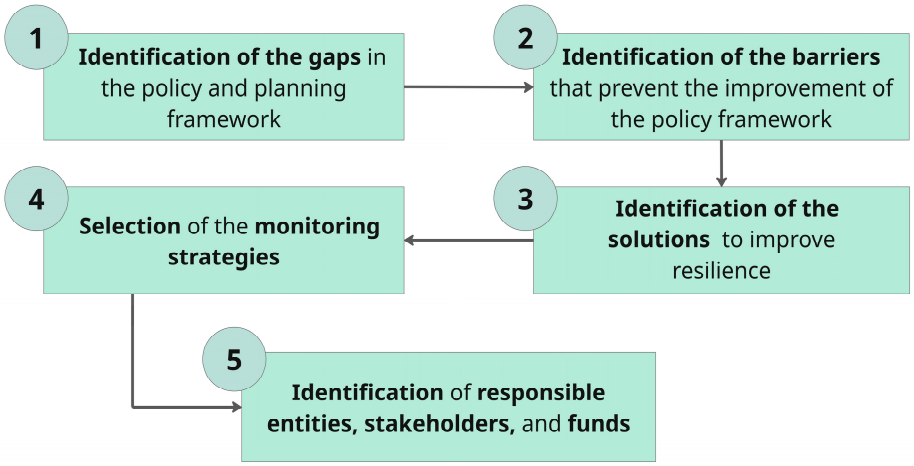


**Figure 2.** Summary of the diagram flow and five steps for building the ADRISEISMIC roadmap.

A questionnaire was prepared and distributed to the six case studies. Each step of the roadmap is divided into six parts, corresponding to the six above-mentioned topics (i.e., seismic norms, building regulation, urban planning regulation, seismic incentive frameworks, post-earthquake planning, and insurance against seismic risk). The questions for all steps are detailed in the Appendix A, Figures A1–A3.

Steps 1 to 3 consist of a critical analysis of the documents in force to select the most suitable solutions (GPs) to enhance the integration of seismic risk into the current policy and planning framework. The last two steps deal, respectively, with the implementation and monitoring phases. The first step starts with the comparison matrix developed in [1] to obtain a list of gaps in the current policy and planning framework. The results of the replicability and scalability assessment of GPs represent the basis and the available knowledge upon which to draft the second and third steps. The second step evaluates the policy and planning framework to identify possible barriers and conditions that might prevent its improvement in terms of seismic risk consideration and integration. The third step consists of selecting some of the highlighted GPs for seismic vulnerability reduction, depending on whether they can be replicated in the local context. Lastly, the aim of the last two steps is to prepare local decision-makers to actually improve the norms, the regulations, and the incentives framework for facing seismic events, by implementing the GPs selected in the third phase. In detail, the fourth step concerns the identification of the necessary entities and funds to replicate and implement the GPs chosen, while the fifth step allows for the selection of the most suitable monitoring strategies.

## 3. Results

Thanks to the 24 workshops organized, a total of 224 different organizations were engaged across the six partner countries. These included 36 local authorities, 9 regional public bodies, 6 national public authorities, 13 sectorial agencies (e.g., government organizations responsible for a specific service in a particular economic sector, such as an environmental agency, immigration agency, or local or regional development agency), 32 higher education institutions, 25 training centers and schools, 11 enterprises, 57 small and medium enterprises (SMEs), and 35 interest groups, including NGOs. Figure 3 conveys the range of stakeholders involved in the process, grouped by target group and country.

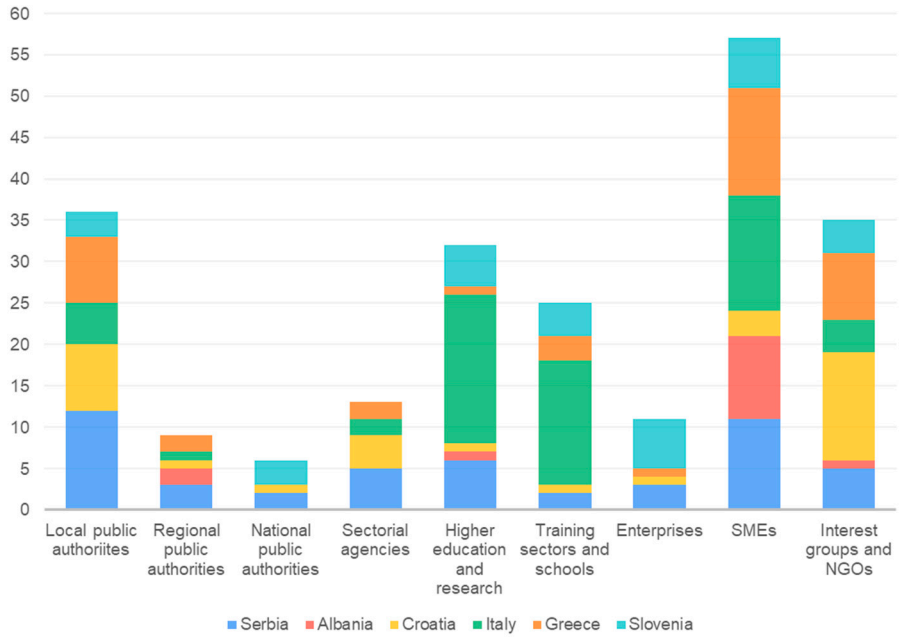


**Figure 3.** Stakeholders clustered according to the target group and the country.

### *3.1. Good Practice Identification and Description*

Table 1 provides an overview of the 23 GPs identified through the assessments conducted in the case studies. These are described in the following sub-sections, clustered by core topic.

**Table 1.** Overview of the collected GPs.

| Topic | GP Code | Title | Country |
|---|---|---|---|
| Seismic norms | GP1 | Eurocode 8 [20] | All |
| | GP2 | Manual for Seismic Retrofitting of the Existing Masonry Buildings [21] | Croatia |
| | GP3 | KAN.EPE—Code of interventions [22] | Greece |
| | GP4 | Guidelines for Assessment and Structural Interventions on Masonry Buildings [23] | Greece |
| | GP5 | DPCM 9/02/2011—Evaluation and reduction of seismic risk for cultural heritage [24] | Italy |
| | GP6 | Emilia-Romagna Regional Law No. 19/2008 for the reduction of seismic risk [25] | Italy |
| | GP7 | D.G.R. n. 2272/2016 List of interventions without relevance for public safety and non-substantial variants [26] | Italy |
| Urban planning | GP8 | Geological Suitability Studies—Ministries' Decision 37691/2007 [27] | Greece |
| | GP9a | Emilia-Romagna Regional Law No. 24/2017: analysis of the local seismic risk as part of the Urban Plan Baseline Framework [28] | Italy |
| | GP9b | Emilia-Romagna Regional Law No. 24/2017: Emergency Limit Condition (CLE) part of the Urban Plan Baseline Framework [28] | Italy |
| | GP9c | Emilia-Romagna Regional Law No. 24/2017: Seismic Microzonation (MS) foreseen in the Urban Planning Baseline Framework [28] | Italy |
| Seismic incentive frameworks | GP10 | FEK 2943/B-2023—Seismic Inspection of Public Buildings Framework for Pre-Earthquake Monitoring of Public Utility Buildings [29] | Greece |
| | GP11 | Sismabonus—Law No. 77/2020 [30] | Italy |
| | GP12 | D.M. No. 58/2017—Guidelines for the Evaluation of Seismic Vulnerability of Buildings [31] | Italy |
| | GP13 | "I Don't Take Risks"—National Awareness Campaign for Risk Prevention and Preparedness [32] | Italy |
| | GP14 | Volumetric Incentives for Seismic Retrofitting Interventions [33] | Italy |

**Table 1.** *Cont.*

| Topic | GP Code | Title | Country |
|---|---|---|---|
| | GP15 | "EDURISK"—Increasing Knowledge and Awareness of Seismic Risk in Schools [34] | Italy |
| | GP16 | "Secure +"—Online Tool to Raise Awareness on Seismic Risk of Italian Municipalities [35] | Italy |
| | GP17 | POTROG Applications [36] | Slovenia |
| Post-earthquake planning | GP18 | General Civil Protection Plan—"Engelados" [37] | Greece |
| | GP19 | Guidelines for Planning and Execution of Civil Protection Exercises [38] | Greece |
| | GP20 | National Seismic Risk Rescue Program DPCM 14/01/2014 [39] | Italy |
| | GP21 | Resolution on Strengthening Earthquake Resilience by 2050 "Beat the earthquake" (ReKPV50) [40] | Slovenia |

#### 3.1.1. Seismic Norms

Based on the previously established parameters for the selection of GPs in the field of seismic norms, seven GPs were identified for their potential impact on reducing seismic vulnerability. Enforced in all the ADRISEISMIC countries, Eurocode 8 is considered a GP as it describes how to design structures in seismic zones using the limit state design philosophy (GP1) [20]. Similarly, GP3 from Greece consists of a regulation dealing with retrofitting and intervention techniques, even though it does not specifically mention cultural heritage buildings [22]. Conversely, both GP2 and GP4 consist of non-binding tools that include some reference to cultural heritage. They were identified from Croatia and Greece, respectively. The aim of the Croatian manual (GP2) is primarily to expand the knowledge about expected earthquake damage to masonry buildings and to provide a broader range of techniques for repairing and strengthening load-bearing structures, supported by the use of graphic material [21]. GP4, from Greece, also includes criteria for the assessment of the seismic performance of masonry buildings, and provides guidance in choosing intervention strategies by setting the criteria for their design [23]. GP5, from Italy, has a similar nature to GP2 and GP4, but is legally binding, and specifically targets cultural heritage buildings [24]. Finally, both GP6 and GP7 are procedural-related documents that are only valid in the Emilia-Romagna region (Italy). GP6 is a regional norm that explains how to design a structural intervention [21]. GP7 identifies which public safety interventions can be considered irrelevant for seismic purposes and which project variations are not of a substantial nature, even if concerning structural parts [26].

#### 3.1.2. Building Regulations

The results indicate that seismic risk reduction is rarely considered, or even mentioned, in building regulations. Reference is often made to building scale without any acknowledgement of the importance of acting for seismic vulnerability reduction at the urban scale. Therefore, despite not having identified any GPs for this topic, some suggestions on how to improve building regulation documents were highlighted during the local workshops and are endorsed directly in the roadmaps.

#### 3.1.3. Urban Planning Regulations

Two GPs were identified within the urban planning regulations and tools for integrating seismic vulnerability aspects into urban planning laws and procedures, and represent some of the first attempts at promoting the assessment of seismic risk at a scale larger than that of individual buildings. GP8, from Greece, is a geological suitability study of rocks for the implementation of general town plans [27]. It is considered a GP due to its

application of detailed geological mapping and hazard recognition to influence the specific spatial zonation, thus subordinating decisions on new settlement development to the study of seismic risk. GP9 refers to the urban planning Regional Law No. 24/2017 from the Emilia-Romagna region in Italy. It promotes a deeper understanding of both the territory and the built environment as the foundation for developing new urban general plans [28]. Among the key topics that all municipalities are required to address under this legislation is seismic risk, which must be developed through three specific studies (referred to as GP9a, GP9b, and GP9c): analysis of the local seismic risk; assessment of the Emergency Limit Condition (CLE) to guarantee operations and accessibility of most of the strategic functions for the emergency; and seismic microzonation studies (MS) to recognize stable and instable zones in cases of earthquakes [28].

#### 3.1.4. Seismic Incentive Frameworks

All eight documents mentioned in Triller et al. [1] have been considered as GPs. The vast majority of these (six out of eight, GPs 11–16) come from Italy, conveying a long history of experience in this field. The remaining two come from Greece (GP10) and Slovenia (GP17). In Greece, the framework for pre-earthquake monitoring of public utility buildings outlines the procedures and methodologies for monitoring the structural integrity of public utility buildings prior to a seismic event [29]. Similarly, the Italian guidelines for the evaluation of seismic vulnerability provide technical criteria and procedures for evaluating how susceptible a building is to earthquake damage based on its design, materials, and structural integrity [31]. In terms of promising digital solutions, Slovenia's "POTROG" applications are part of a comprehensive digital platform designed to manage disaster-related data, coordinate rescue operations, and ensure timely and effective communication among all involved actors [36]. Similarly, the Italian "Secure +" online tool provides easily accessible data and resources on the seismic vulnerability of different regions in Italy, aiming to inform local governments, citizens, and professionals about seismic hazards and necessary mitigation measures [35]. Also, "I don't take risks" and "EDURISK" are two Italian initiatives with the primary aim of increasing knowledge and awareness about seismic risk [32,34]. The two remaining GPs refer to the Italian context and provide economic or volumetric incentives for seismic retrofitting interventions. Specifically, they offer either reimbursement for expenses [22] or additional building volume and density to property owners who invest in seismic strengthening measures [25].

#### 3.1.5. Post-Earthquake Planning

Out of the 28 documents collected, only four GPs were selected under the post-earthquake planning topic [1]. They refer either to planning activities in the post-earthquake stage, such as the "Italian Seismic Risk Rescue Programme" [39], or to the general organization of prevention and response activities by civil protection authorities. The latter is the case for both the "Greek General Civil Protection Plan "Engelados"", which aims at enhancing Greece's preparedness and resilience against seismic events by outlining procedures for risk assessment, emergency response, and coordination among various governmental actors [37], as well as the "Guidelines for planning and execution of civil protection drills", which aim to enhance readiness through structured training simulations [38]. Additionally, the Slovenian GP21 represents a long-term national strategy for reducing seismic risk and increasing the safety and resilience of the built environment by 2050. It sets clear goals for assessing seismic vulnerability, retrofitting priority buildings, and emphasizes the importance of education, awareness, and community preparedness for earthquakes [40]. All GPs in this category—except GP19—are mandatory policy instruments in their respective contexts, and half of them directly refer to cultural heritage (e.g., GP18, GP21).

#### 3.1.6. Insurance Against Earthquakes

No GPs were identified for the topic of insurance against earthquakes. During the second series of local workshops, stakeholders were interviewed to collect data about the insurance systems and their applicability, but this issue turned out to be very complex and largely under-investigated. Therefore, instead of identifying GPs, this research includes key proposals on how to improve insurance against earthquakes, and these have been directly endorsed in the roadmaps.

#### 3.1.7. Comparative Analysis Between Different Topics

In the process of highlighting GPs, all relevant characteristics (i.e., timeframe, target groups, SWOT analysis, reference to cultural heritage, etc.) were taken into account. A comparison of the highlighted GPs by topic conveys that the majority (seven each) fall under the categories of seismic norms and seismic incentive frameworks. However, the seismic norms category is the only one that collected contributions from all the countries. In all the remaining categories, only a few countries (e.g., Greece, Italy, and Slovenia) provided GPs, thus highlighting the necessity of further improving the general situation of the planning and incentive framework. A comparison of the highlighted GPs concerning the countries of the consortium in which the practices are in force shows that Italy and Greece are at the forefront. One of the main reasons for this is the experience that these two countries have with strong earthquakes. As a result, these two countries were forced to introduce many norms and incentives that would reduce the seismic vulnerability of the built environment. A summary of these considerations is exemplified in Figure 4.

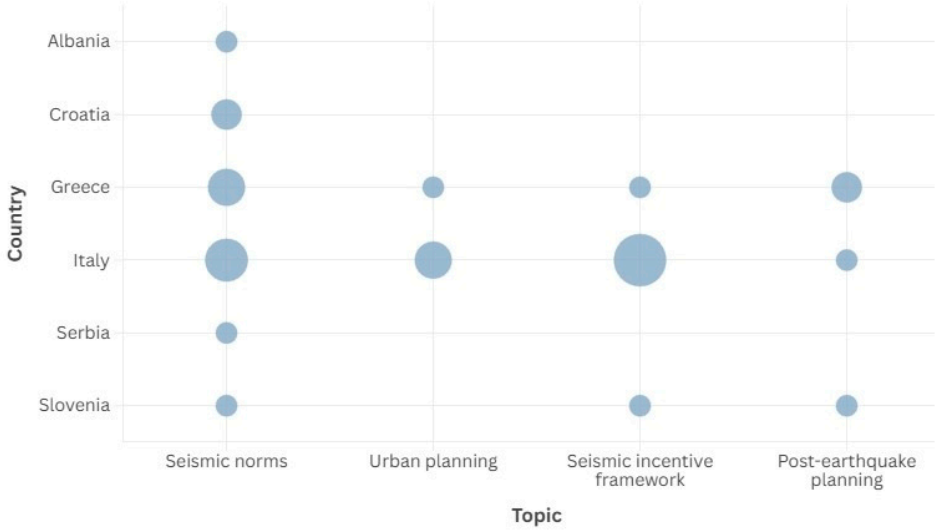


**Figure 4.** Scatter plot highlighting the distribution of GPs by considering both the topic and the country they belong to. The circles are scaled based on the number of GPs.

### *3.2. Good Practice Replicability and Scalability*

The results of the potential for replicability and scalability are presented in Table 2, clustered according to the investigated country. The assessment was performed only for the GPs originating from different countries.

**Table 2.** Results of the potential for replicability (R) and scalability (S) assessment. For replicability: 1 = not replicable, 2 = possible replication, 3 = very likely to be replicated, 3* = very likely replication, as, indeed, a very similar practice is already in place. For scalability: 1 = scalability at the national level not possible, 2 = possible replication at the national level, with the regional level that seems appropriate; 3 = very likely replication at the national level; n.a = not applicable. Grey-colored cells mean that the GP is already in force in the country.

| | | **Albania** | | **Croatia** | | **Greece** | | **Italy** | | **Serbia** | | **Slovenia** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Topic** | **GP Number** | **R** | **S** | **R** | **S** | **R** | **S** | **R** | **S** | **R** | **S** | **R** | **S** |
| Seismic norms | GP1 | | | | | | | | | | | | |
| | GP2 | 3 | 3 | | | 2 | 1 | 3* | 3 | 3* | 3 | 3* | 3 |
| | GP3 | 1 | 2 | 2 | 2 | | | 3* | 3 | 2 | 3 | 2 | 3 |
| | GP4 | 3 | 3 | 2 | 2 | | | 3* | 3 | 2 | 3 | 2 | 3 |
| | GP5 | 2 | 2 | 2 | 3 | 2 | 2 | | | 2 | 3 | 2 | 3 |
| | GP6 | 2 | 2 | 2 | 3 | 2 | 3 | | | 1 | 3 | 2 | 3 |
| | GP7 | 2 | 3 | 1 | n.a. | 2 | 2 | | | 2 | 3 | 2 | 3 |
| Urban planning regulation | GP8 | 2 | 1 | 3* | 3 | | | 3* | 1 | 2 | 3 | 3 | 3 |
| | GP9a | 3 | 2 | 3* | 3 | 2 | 3 | | | 2 | 2 | 3* | 3 |
| | GP9b | 1 | 1 | 2 | 2 | 3 | 1 | | | 2 | 3 | 3* | 3 |
| | GP9c | 1 | 1 | 3* | 2 | 3 | 2 | | | 2 | 3 | 2 | 3 |
| Seismic incentive frameworks | GP10 | 2 | 3 | 2 | 2 | | | 2 | 2 | 2 | 3 | 2 | 3 |
| | GP11 | 2 | 2 | 3 | 3 | 2 | 3 | | | 2 | 3 | 2 | 3 |
| | GP12 | 2 | 3 | 3 | 3 | 3 | 3 | | | 2 | 3 | 3* | 3 |
| | GP13 | 2 | 1 | 2 | 3 | 2 | 1 | | | 2 | 3 | 3* | 3 |
| | GP14 | 3 | 2 | 2 | 2 | 2 | 2 | | | 2 | 2 | 2 | 3 |
| | GP15 | 2 | 2 | 3 | 3 | 3 | 1 | | | 2 | 3 | 3* | 3 |
| | GP16 | 2 | 3 | 2 | 3 | 2 | 3 | | | 2 | 3 | 3* | 3 |
| | GP17 | 2 | 3 | 2 | 2 | 2 | 3 | 2 | 2 | 2 | 3 | | |
| Post-earthquake planning | GP18 | 1 | 1 | 3 | 3 | | | 3* | 3 | 2 | 3 | 3* | 3, 2, 1 |
| | GP19 | 2 | 2 | 3 | 3 | | | 3 | 3 | 2 | 3 | 3* | 3, 2, 1 |
| | GP20 | 3 | 3 | 2 | 2 | 2 | 3 | | | 2 | 3 | 3* | 3, 2, 1 |
| | GP21 | 3 | 3 | 3* | 3 | 3 | 1 | 3* | 3 | 2 | 3 | | |

#### 3.2.1. Scalability and Replicability Assessment in Albania

Only one GP is already in force in Albania (GP1: Eurocode 8). The results of the survey indicate that in Albania, there are practical opportunities to transfer foreign practices across all topics. In the area of seismic norms, there is strong potential for replicability of techniques for strengthening masonry buildings. Some guidelines (e.g., GP2, GP4) are particularly relevant, as the architectural features of the town of Gjirokaster are based on masonry constructions. In the case of urban planning regulations, there is notable potential to replicate the analysis of the local seismic risk while drafting a new urban plan (GP9a). The seismic incentives framework is largely underdeveloped in Albania, but there are opportunities to introduce direct financial and economic incentives, as well as indirect incentives (e.g., raising awareness). Within the field of post-earthquake planning in Albania, GP20 and GP21 are the ones that can be most likely replicated.

#### 3.2.2. Scalability and Replicability Assessment in Croatia

Two GPs are already in force in Croatia, both belonging to the seismic norms category, with the remaining four of the same field not considered highly replicable in the local Croatian context. For urban planning regulations, some documents exist that are similar to the GPs highlighted. However, the potential for the embedding of microzonation studies in urban plans is considered replicable at the regional level. The seismic incentives framework remains the topic with the greatest potential for improvement in Croatia, with

three out of eight GPs considered highly replicable at the national level. There is potential to adopt direct financial and economic incentives, as well as indirect incentives focused on raising awareness, though adjustments would be required to suit the national context. Within the field of post-earthquake planning in Croatia, activities are underway to prepare a document similar to a general civil protection plan. Further, both the guidelines for planning and execution of civil protection drills and the national seismic risk rescue program are considered important instruments to be replicated at all administrative levels. However, both would require strong cooperation and coordination among various authorities.

#### 3.2.3. Scalability and Replicability Assessment in Greece

Despite Greece providing seven GPs, several possibilities for improvement are still possible. The GPs considered highly replicable fall within the topics of urban planning, seismic incentives, and post-earthquake planning. In the case of urban planning regulations, MS studies (GP9c), which are mandatory by law, are considered an improvement over similar existing studies in Greece. Additionally, introducing a document similar to the CLE (GP9b) as part of the Urban Plan Baseline Framework would provide a clear approach to addressing cultural heritage in the aftermath of an earthquake. Further, the scalability of both measures at the national level would be of great importance. In the field of seismic incentive frameworks, the "guidelines for the evaluation of seismic vulnerability of buildings" (GP12) and "EDURISK" initiative (GP15) are considered important practices to replicate at the national and local levels. These initiatives highlight the importance of the seismic retrofitting of historic Greek buildings and emphasize the need to include diverse target groups in already existing awareness-raising campaigns (e.g., schools). As for post-earthquake planning, Greece already possesses two out of four GPs. However, adopting a national program for seismic risk reduction would foster a systemic approach to disaster risk management.

#### 3.2.4. Scalability and Replicability Assessment in Italy

Fourteen out of the twenty-three GPs originate from Italy. Moreover, six of the foreign GPs already have similar counterparts in the country and can, therefore, be considered as adopted. Nevertheless, opportunities for improvement have been identified, especially in the case of seismic incentives and post-earthquake planning. Notably, only GP19, concerning the execution of civil protection drills, has been rated as highly replicable and is regarded by stakeholders as an important instrument for increasing the awareness of citizens. In terms of its scalability at the national level, the civil protection drills can be organized across all administrative levels, from the national to the municipal, involving various actors.

#### 3.2.5. Scalability and Replicability Assessment in Serbia

Aside from Albania, Serbia is the only other country with only one GP currently in force (GP1). None of the remaining GPs have been rated as highly replicable, and only one (GP6) has been considered not replicable. In terms of scalability, 21 GPs could potentially be applied at the national level, given Serbia's size and the relative homogeneity of engineering practices across the country. However, GP9a and GP14 are most suitable if applied at the regional level, due to the presence of several regions with different levels of seismic activity and building stock.

#### 3.2.6. Scalability and Replicability Assessment in Slovenia

Three GPs have been identified within the Slovenian context, and ten foreign GPs already exist in a similar form. Among the remaining GPs, GP8 (which emphasizes the necessity of subordinating urban planning strategies to the knowledge of soil characteristics)

is the only one rated as highly replicable. While seismic risk and some geological maps are already available in Slovenia, only the seismic risk map is legally required for use in seismic building design. The geological maps, on the other hand, are currently not suitable for practical use in urban planning. GP8 is considered suitable for implementation at the national level.

### *3.3. Roadmaps*

The following sections describe the results of applying the ADRISEISMIC roadmap to the six case studies. Results are reported according to the five steps.

#### 3.3.1. Step 1—Identification of the Gaps in the Policy and Planning Framework

As described in the methodology, the first step aims to identify the gaps in the policy and planning framework, assessing whether the seismic risk and the vulnerability of the urban area are considered. Table 3 shows the results of the first phase of the ADRISEISMIC roadmap, grouped by topic and country.

**Table 3.** Results from the ADRISEISMIC roadmap, Step 1. Identification of the gaps. Legend: green box = yes; red box = no; white box = not applicable; AL = Albania; HR = Croatia; GR = Greece; IT = Italy; RS = Serbia; SI = Slovenia.

| Topic | STEP 1. Identification of the Gaps | AL | HR | GR | IT | RS | SI |
|---|---|---|---|---|---|---|---|
| Seismic norms | 1.1. Is any document in force to consider the seismic risk of existing buildings? | | | | | | |
| | 1.2. Is there a specific focus on the evaluation and reduction in seismic risk for cultural heritage in the actual seismic norms? | | | | | | |
| | 1.3. Is the seismic norms apparatus flexible enough and efficient from a procedural point of view for the reduction in seismic risk? | | | | | | |
| Building regulations | 2.1. Are building regulations drafted considering the seismic risk of the urban realm? | | | | | | |
| | 2.2. Are building regulations taking into consideration seismic risk for the interventions on existing buildings? | | | | | | |
| Urban planning regulations | 3.1. Are urban planning regulations drafted considering the seismic risk? | | | | | | |
| | 3.2. Are the urban planning laws and tools drafted following the principles of sustainable development and protection of cultural heritage? | | | | | | |
| | 3.3. Are urban planning regulations and urban planning tools drafted considering the emergency phase? | | | | | | |
| Seismic incentive framework | 4.1. Do economic incentives for the reduction in seismic risk in buildings exist? | | | | | | |
| | 4.1.1. If yes, is the amount of the incentive appropriate? | | | | | | |
| | 4.1.2. If yes, are they effective? | | | | | | |
| | 4.4. Do indirect incentives for raising awareness about the seismic vulnerability of the built heritage exist? | | | | | | |
| Post-earthquake planning | 5.1. Does a disaster risk management plan exist? | | | | | | |
| | 5.2. Is the preparedness phase considered in planning the emergency phase? | | | | | | |
| | 5.3. Are the response and the rehabilitation after earthquake incidents planned? | | | | | | |
| | 5.4. Do post-earthquake planning documents deal with cultural heritage buildings? | | | | | | |
| Insurance against earthquakes | 6.1. Is insurance against earthquake legally binding? | | | | | | |
| | 6.2. Is the amount of the premium and the conditions to stipulate the contract favorable for the owners? | | | | | | |
| | 6.3. Is it convenient for the owners to stipulate insurance against earthquakes? | | | | | | |

Concerning seismic norms, Italy and Greece are the countries better equipped with planning tools that take seismic risk into account, and both have procedures in place to

mitigate this specific risk. In contrast, Croatia and Serbia lack such documentation, while Albania and Slovenia each have at least one norm that addresses seismic risk. Albania, Italy, and Greece have established building regulations considering seismic risk for interventions on existing buildings. Conversely, Slovenia only has a regulation considering the risk at the urban scale, while Croatia and Serbia have none. With respect to gaps in urban planning regulations, Croatia, Slovenia, and Serbia are in the least favorable situation, lacking any current documentation on the matter. Conversely, it is possible to find urban planning tools dealing with seismic risk, principles of sustainable development, cultural heritage protection, and the seismic emergency phase in Albania, Greece, and Italy. Italy has established a comprehensive seismic incentive framework, including direct measures for building risk reduction and indirect measures to enhance awareness of seismic vulnerability. Croatia's framework is similar, but its direct incentives are considered ineffective. Slovenia offers only indirect incentives, whereas Albania, Greece, and Serbia have no such framework in place. In terms of post-earthquake planning, all six PP countries have risk management plans in force that address the emergency phase, response, and rehabilitation following earthquake incidents. The only thing that distinguishes Serbia and Slovenia from the other countries is that their planning tools do not deal with cultural heritage. Finally, as previously highlighted, none of the six countries has a legally binding and effective insurance system against earthquakes.

#### 3.3.2. Step 2—Identification of Barriers That Prevent the Improvement of the Policy Framework

The second phase of the roadmap methodology aims to identify the obstacles that might hinder improvements in the policy and planning framework. Table 4 shows the results by topic and country.

All six PP countries recognized the lack of procedures for evaluating seismic risk at a scale larger than individual buildings and the absence of detailed knowledge about territorial seismic risk. Furthermore, insufficient funding for macro-level seismic risk assessment is another major obstacle in almost all countries, with the exception of Italy. In relation to building and urban planning regulations, and consistent with the challenges in seismic norms, all countries except Croatia see the lack of procedures for evaluating seismic risk beyond individual buildings and the absence of detailed knowledge of territorial seismic risk as two main barriers to enhancing the planning framework. A significant impediment for Croatia, Greece, Serbia, and Slovenia is also the insufficient funding available for macro-level seismic risk assessment, both for building regulations and urban planning regulations. The lack of financial support is also recognized as a major obstacle to countries adjusting the seismic incentive framework in all six countries. In this area, the absence of knowledge about the benefits, along with the lack of data and methods to ensure the sustainability of incentives, are two barriers recognized by the majority of countries. In terms of post-earthquake planning, four out of six countries recognize the lack of political interest as a barrier to improving the framework. Regarding earthquake insurance tools, all countries cite the lack of political interest in investigating insurance possibilities as a key impediment. In addition, nearly all countries recognize barriers to improving earthquake insurance: lack of knowledge about available benefits, insufficient data and methods for sustainable insurance, limited economic resources for insurance companies to cover large-scale disasters, and lack of clear benefits for owners.

**Table 4.** Results from the ADRISEISMIC roadmap, Step 2. Identification of the barriers. Legend: light blue box = selected; white box = not selected; AL = Albania; HR = Croatia; GR = Greece; IT = Italy; RS = Serbia; SI = Slovenia.

| Topic | STEP 2. Identification of the Barriers | AL | HR | GR | IT | RS | SI |
|---|---|---|---|---|---|---|---|
| Seismic norms | Lack of political interest in the improvement | | ■ | ■ | | | ■ |
| | Experts lack technical knowledge | | ■ | ■ | | ■ | |
| | Lack of procedures to evaluate the seismic risk at a larger scale than one building | ■ | ■ | ■ | ■ | ■ | ■ |
| | Lack of detailed knowledge about the seismic risk at the territorial level | ■ | ■ | ■ | ■ | ■ | ■ |
| | Lack of money for the assessment of seismic risk at the macro level | ■ | ■ | ■ | | ■ | ■ |
| Building regulations | Lack of political interest in the improvement | | | ■ | | | ■ |
| | Experts lack technical knowledge | | | ■ | | ■ | |
| | Lack of procedures to evaluate the seismic risk at a larger scale than one building | ■ | | ■ | ■ | ■ | ■ |
| | Lack of detailed knowledge about the seismic risk at the territorial level | ■ | | ■ | ■ | ■ | ■ |
| | Lack of money for the assessment of seismic risk at the macro level | | ■ | ■ | | ■ | ■ |
| Urban planning regulations | Lack of political interest in the improvement | ■ | | ■ | | | ■ |
| | Experts lack technical knowledge | | | ■ | | ■ | |
| | Lack of procedures to evaluate the seismic risk at a larger scale than one building | ■ | | ■ | ■ | ■ | ■ |
| | Lack of detailed knowledge about the seismic risk at the territorial level | ■ | | ■ | ■ | ■ | ■ |
| | Lack of money for the assessment of seismic risk at the macro level | | ■ | ■ | | ■ | ■ |
| Seismic incentive framework | Lack of political interest in the improvement | | | ■ | | ■ | ■ |
| | Absence of public interest in seismic provisions | | ■ | | | | ■ |
| | Lack of financial support | ■ | ■ | ■ | ■ | ■ | ■ |
| | Absence of knowledge about the benefit available | ■ | ■ | | | ■ | ■ |
| | Lack of data and methods to make the incentive sustainable | ■ | ■ | ■ | | ■ | ■ |
| | Lack of awareness of seismic risk | | ■ | | | ■ | ■ |
| | Lack of skills in communication of incentives from the policymakers | | ■ | ■ | | | ■ |
| Post-earthquake planning | Lack of political interest in the improvement | | ■ | ■ | ■ | | ■ |
| | Lack of cooperation and coordination among authorities | | ■ | ■ | ■ | | |
| | Absence of the civil protection structure | ■ | ■ | | | | |
| Insurance against earthquakes | Lack of political interest in investigating the insurance possibilities | ■ | ■ | ■ | ■ | ■ | ■ |
| | Government policies on reconstruction process are disincentives for stipulating insurance contracts | | | | ■ | ■ | ■ |
| | Lack of knowledge about the benefits available | | ■ | | ■ | ■ | ■ |
| | Lack of data and methods to make the insurance sustainable | | ■ | ■ | ■ | ■ | ■ |
| | Lack of awareness about seismic risk | | ■ | | | ■ | ■ |
| | Lack of economic resources of insurance companies to cover expenses of a large-scale disaster | | ■ | ■ | ■ | | ■ |
| | Lack of clear benefits for the owners in having insurance against earthquakes | | | ■ | ■ | ■ | ■ |

#### 3.3.3. Step 3—Identification of Possible Solutions to Improve Resilience

As a third step, the method identifies the potential solutions (GPs) to improve the policy and planning framework. Table 5 shows the results grouped by topic and country.

Only four out of six topics were considered, as two of them (i.e., building regulations and earthquake insurance) do not include any GPs (as highlighted in Sections 3.1.2 and 3.1.6). However, for the building regulation category, the roadmap suggests that all countries adopt planning tools aimed at reducing seismic risk at the local scale. Similarly, regarding insurance against earthquakes, the roadmap tool recommends investigating possible advantages for both governments and building owners, exploring the possibility of connecting insurance to the emergency planning and preparedness phases, and selecting priorities for establishing mandatory insurance in selected urban areas based on the outcomes of a large-scale urban seismic risk assessment.

**Table 5.** Results of the ADRISEISMIC roadmap, Step 3. Identification of the solutions. Legend: light blue box = selected; white box = not selected; grey box = already implemented; AL = Albania; HR = Croatia; GR = Greece; IT = Italy; RS = Serbia; SI = Slovenia.

| Topic | STEP 3 | AL | HR | GR | IT | RS | SI |
|---|---|---|---|---|---|---|---|
| Seismic norms | GP2 | | | | | | |
| | GP3 | | | | | | |
| | GP4 | | | | | | |
| | GP5 | | | | | | |
| | GP6 | | | | | | |
| | GP7 | | | | | | |
| Urban planning regulations | GP8 | | | | | | |
| | GP9a | | | | | | |
| | GP9b | | | | | | |
| | GP9c | | | | | | |
| Seismic incentive framework | GP10 | | | | | | |
| | GP11 | | | | | | |
| | GP12 | | | | | | |
| | GP13 | | | | | | |
| | GP14 | | | | | | |
| | GP15 | | | | | | |
| | GP16 | | | | | | |
| | GP17 | | | | | | |
| Post-earthquake planning | GP18 | | | | | | |
| | GP19 | | | | | | |
| | GP20 | | | | | | |
| | GP21 | | | | | | |
| | Other | | | | | | |

Concerning seismic norms, the "guidelines for assessment and structural interventions on masonry buildings" (GP4), the "evaluation and reduction of seismic risk for cultural heritage" (GP5), and the "regional norms for the reduction of seismic risk" (GP6) are the GPs selected by all countries, excluding the countries where the GP originated. Notably, Croatia, Italy, Serbia, and Slovenia chose all available solutions to address their specific conditions. Under the urban planning regulation topic, the roadmap advises all countries to elaborate strategies and urban plans based on the assessment of seismic risk at the urban scale. In addition, the "Geological suitability studies of Rocks for the implementation of General Town plans" (GP8) from Greece and the "Integration of seismic vulnerability assessment into urban plans—Regional Law no. 24/2017" (GP9a) from Italy are among the two GPs most frequently selected by the case studies, while Croatia and Serbia opted for all available GPs in this category. All countries, excluding the ones where the GP originated, selected the following three seismic incentives: "Framework for pre-earthquake monitoring of public utility buildings" (GP10), "Sismabonus—national incentives for seismic retrofit of buildings" (GP11), and "POTROG" applications (GP17), while Albania, Croatia, and Serbia chose all eight available solutions from this topic. Regarding post-earthquake planning, Croatia and Serbia selected all available options (from GP18 to GP21). The only two GPs chosen by at least four countries are the "Guidelines for planning and execution of civil protection drills" (GP19) and the "National Seismic Risk Rescue Program" (GP20). Notably, Slovenia did not select any post-earthquake planning GPs for replication, indicating that only general improvements to its current laws are sufficient.

3.3.4. Step 4—Identification of Responsible Entities, Stakeholders, and Funds

The fourth step of the roadmap aims to identify the responsible entities for implementing the provisions included in the roadmaps, the stakeholders who might contribute to improving the policy and planning framework, and the funds available for implementation. Figures 5–7 present the results, clustered by country. A more comprehensive overview of the results for this step is provided in Table A1 in Appendix A.

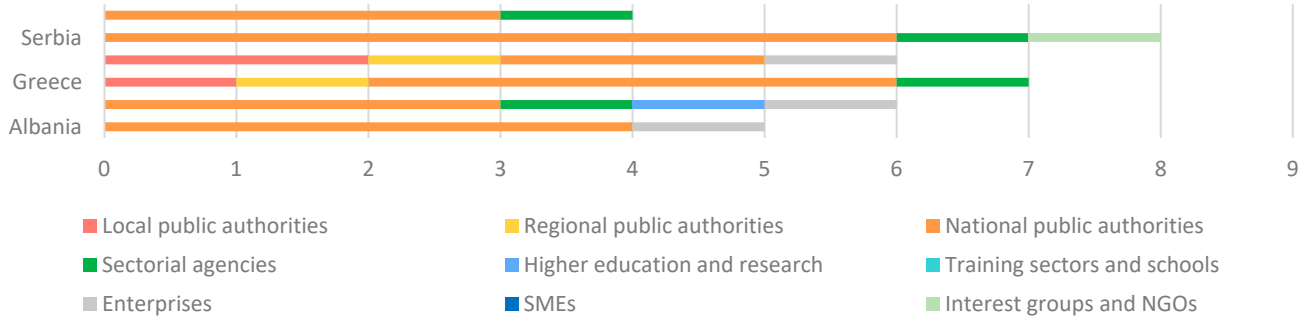


**Figure 5.** Number and typology of stakeholders identified as responsible entities by country.

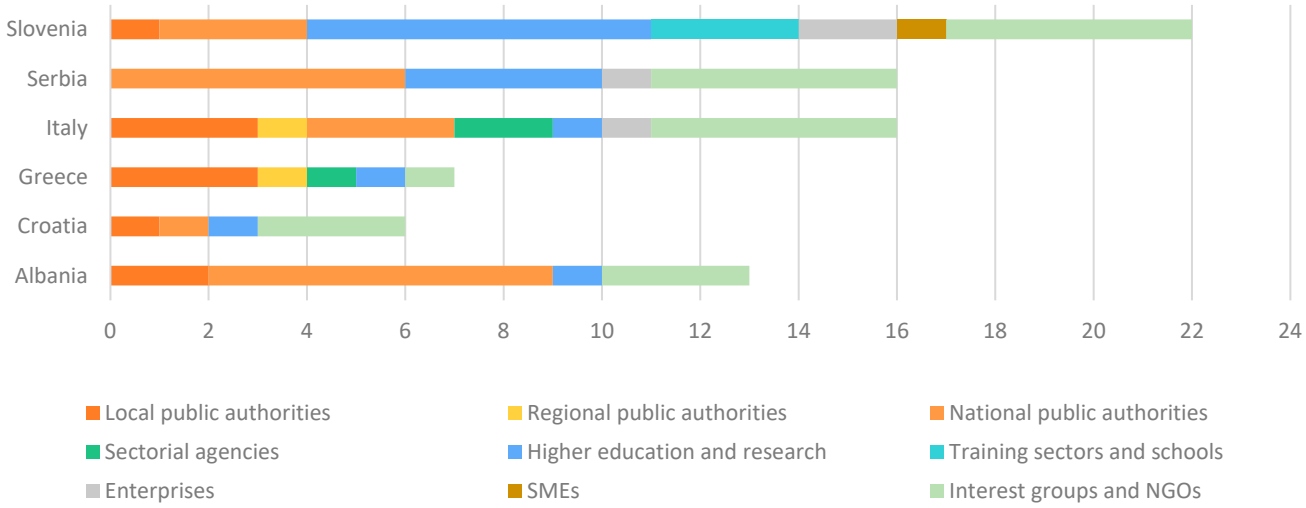


**Figure 6.** Number and typology of stakeholders identified as potential contributors by country.

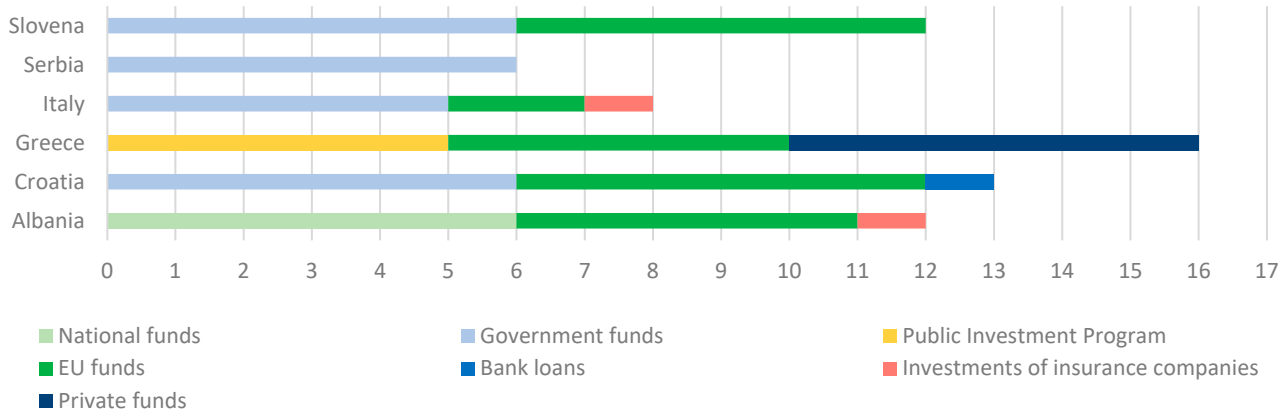


**Figure 7.** Number of identified funds according to their typology and clustered by country.

A minimum of two national public authorities were identified as potential responsible entities in all countries; notably, Serbia identified six (Figure 5). Italy and Greece also chose regional and local authorities as actors who could take the lead in implementing the

solutions, while Croatia identified enterprises, universities, and sectorial agencies such as the Croatian Standards Institute. Concerning sectorial agencies, Greece, Serbia, and Slovenia also selected actors in this category as responsible entities. Albania and Italy each identified one enterprise as a potential responsible entity for implementing earthquake insurance measures.

With regard to stakeholders who might contribute to improving the policy and planning framework (Figure 6), Slovenia identified the largest number of entities (22 in total). All countries selected at least one stakeholder from two different categories: interest groups and NGOs, and higher education and research, such as academia and research centers. All case studies indicated the government, state agencies, or ministries as potential contributors, while the local administration level was recognized as a key actor by all countries except Serbia. In the insurance field, Italy, Serbia, and Slovenia identified insurance companies as important entities to involve.

As shown in Figure 7, all case studies identified EU funds as a possible funding source, except Serbia, which indicated only government funds as a source for funding for the improvement of all six topics in the policy and planning framework. In addition to Serbia, government funds were also mentioned by Croatia, Italy, and Slovenia, representing the second most chosen financing typology. Albania and Greece considered other forms of public funding and private funds. Regarding insurances against earthquakes, both Italy and Albania identified investment from insurance companies, while Croatia indicated bank loans.

#### 3.3.5. Step 5—Selection of the Monitoring Strategies

As described in the methodology, the fifth step aims to identify viable monitoring strategies for each topic. Table 6 shows the results of the fifth and last step of the ADRISEISMIC roadmap methodology, clustered by topic and country.

**Table 6.** Results from ADRISEISMIC roadmap, Step 5. Selection of the monitoring strategies. Legend: light blue box = selected; white box = not selected; AL = Albania; HR = Croatia; GR = Greece; IT = Italy; RS = Serbia; SI = Slovenia.

| Topic | STEP 5. Selection of the Monitoring Strategies | AL | HR | GR | IT | RS | SI |
|---|---|---|---|---|---|---|---|
| Seismic norms | Define monitoring indicators | ■ | | ■ | ■ | ■ | ■ |
| | Establish which agency or committee will be responsible for monitoring activities | ■ | | | ■ | ■ | ■ |
| | Other | | ■ | | | | |
| Building regulations | Define monitoring indicators | ■ | | ■ | ■ | ■ | ■ |
| | Establish which agency or committee will be responsible for monitoring activities | ■ | | | ■ | ■ | ■ |
| | Other | | ■ | | | | |
| Urban planning regulations | Define monitoring indicators | ■ | | ■ | ■ | ■ | ■ |
| | Establish which agency or committee will be responsible for monitoring activities | ■ | | | ■ | ■ | ■ |
| | Other | | ■ | | | | |
| Seismic incentive framework | Define monitoring indicators | | | ■ | ■ | ■ | ■ |
| | Establish which agency or committee will be responsible for monitoring activities | ■ | | ■ | ■ | ■ | ■ |
| | Undertake regular reviews of the seismic incentive framework effectiveness | ■ | | ■ | ■ | ■ | ■ |
| | Other | | ■ | | | | |

**Table 6.** *Cont.*

| Topic | STEP 5. Selection of the Monitoring Strategies | AL | HR | GR | IT | RS | SI |
|---|---|---|---|---|---|---|---|
| Post-earthquake planning | Undertake regular activities to increase preparedness | | ■ | ■ | ■ | ■ | ■ |
| | Test pre-disaster planning, preparation, and staff capabilities through recovery exercises | ■ | ■ | ■ | ■ | ■ | ■ |
| | Establish which agency or committee will be responsible for overseeing ongoing preparedness activities | ■ | ■ | | ■ | ■ | ■ |
| | Define monitoring indicators | ■ | ■ | ■ | ■ | ■ | ■ |
| | Establish which agency or committee will be responsible for monitoring activities | ■ | ■ | | ■ | ■ | ■ |
| | Other | | ■ | | | | |
| Insurance against earthquakes | Conduct regular assessment of the number of insurance contracts available or stipulated | ■ | ■ | ■ | ■ | ■ | ■ |
| | Undertake regular reviews of the insurance's features | ■ | ■ | ■ | ■ | ■ | ■ |
| | Define monitoring indicators | ■ | ■ | ■ | ■ | ■ | ■ |
| | Establish which agency or committee will be responsible for monitoring activities | ■ | ■ | ■ | ■ | ■ | ■ |
| | Other | | | | | | |

The definition of monitoring indicators and the identification of related responsible entities are the two strategies most frequently selected by case studies across all six policy and planning framework topics. For four out of six categories, Croatia did not select any of the suggested options but indicated that the implementation of monitoring strategies is ongoing. All six countries considered testing pre-disaster planning, preparation, and staff capabilities through recovery exercises a valid monitoring strategy for post-earthquake planning. In addition, five out of six countries chose to undertake regular activities to increase preparedness and establish which agency or committee will be responsible for overseeing ongoing preparedness activities. Regarding insurance against earthquakes, all six countries selected all four available options. These include regularly assessing insurance coverage and reviewing insurance features, as well as defining monitoring indicators and responsible entities.

## 4. Discussion

As shown in the Section 3, the methodology supports the identification of tailored and context-specific pathways for enhancing the resilience of historic areas. Its added value resides both in the process that the participating countries undertook and in the different fields that have been considered as essential to improving urban resilience. Regarding the process, the methodology does not merely offer generic recommendations for reducing vulnerability to seismic risk, but rather promotes a profound knowledge of what is already in place or what has been tested in similar countries that share comparable hazard conditions and disaster risk management challenges. Transnational cooperation among institutions and the transfer of best practices are foundational pillars that have enabled countries to capitalize on this extensive knowledge framework and to develop tailored, site-specific, step-by-step pathways toward seismic risk reduction in urban areas.

The methodology also reflects a shift in the approach to seismic risk reduction, promoting a broader interpretation of the concept by addressing it at the urban scale rather than at the level of individual buildings. In this regard, the results indicate that current urban planning instruments and regulations still do not adequately address the concept of seismic vulnerability. This is largely due to the absence of procedures for assessing seismic risk at the urban scale and the lack of detailed territorial knowledge, which are two of the common challenges shared across all the countries considered. Furthermore, in terms of

GP identification, the category of building regulations appears to be underrepresented. However, at present, building regulations offer an opportunity for local governments to intervene on the existing building stock by specifying, through these instruments, how to enhance the resilience of the built environment, while also promoting urban regeneration practices. Consequently, a more effective integration of seismic risk reduction measures into such regulatory tools at the municipal level is viewed as a significant step forward.

Although the key role of adaptive governance systems in reducing disaster risk and improving the alignment of different policies and planning instruments is acknowledged, results show that the lack of political interest in the improvement of the different types of instruments is a common barrier across countries. This is particularly evident in the post-earthquake planning and insurance fields. When it comes to building and urban planning regulation, the barriers for improvement are mainly caused by a lack of detailed knowledge of procedures about seismic risk assessment at the territorial scale. This emphasizes the importance of investing in training and skill development, including in public administrations.

The following discussion is organized by country, with an overview focusing on the key characteristics of the six roadmaps developed through the application of the methodology to the case studies. This is followed by a comparative analysis that identifies key differences and shared challenges across the six countries.

### *4.1. Albania*

Albania's seismic norm, "Eurocode 8" (GP1), describes how to design buildings in seismic zones but lacks specific guidelines for the assessment and mitigation of risks to cultural heritage, thus resulting in inadequate preparation, in light of the region's seismic vulnerabilities. Common barriers to improving this regulatory framework include inadequate procedures for evaluating seismic risk, a lack of risk assessment expertise, and limited financial resources. To address these challenges, updates are needed, such as legislation tailored to existing buildings and specific strategies to reduce seismic risks to cultural heritage, i.e., "Manual—Techniques of repair and reinforcement of masonry buildings" (GP2), "Guidelines for assessment and structural interventions on masonry buildings" (GP4), and "Evaluation and reduction of seismic risk for cultural heritage" (GP5). Responsible entities for the implementation of these GPs include the Scientific Council of the Ministry of Infrastructure and Energy, with stakeholders comprising academia and the Technical Chamber.

Although seismic vulnerability is acknowledged in building regulations, similar improvements are needed in this area. There are barriers such as inadequate assessment procedures and a lack of funding. The Ministry of Culture and the Ministry of Urban Development are cited as the primary responsible entities for various improvements, with structural engineers and architects playing an important role in these efforts.

In terms of urban planning, regulations take seismic risk into account but also require enhancements. Again, identified obstacles include insufficient procedures, skills, and funding for evaluating seismic risk at the territorial level. The Ministry of Culture and the Ministry of Urban Development are also responsible for improving urban planning. The GPs selected for adoption and replication are urban strategies and plans based on the assessment of seismic risk at the urban level, developed based on the seismic features of the territory and the local seismicity (GP8), and considering the emergency condition (GP9a).

For seismic norms, building regulations, and urban planning regulations, the main sources of funding are the national and IPA funds, which should be accompanied by strategies for monitoring progress of the actions involving the establishment of monitoring indicators and defining their responsible entities.

Albania currently lacks both direct and indirect incentives for seismic risk reduction, which is attributed to insufficient political will, financial support, and awareness about the benefits available. The Assembly of the Republic of Albania has been cited as the key entity to enhance the incentives framework, while interested stakeholders consist of multiple national entities, including the Ministry of Civil Protection and the National Agency of Civil Protection. Strategies for monitoring the progress of these initiatives will involve defining responsibilities and conducting regular reviews to evaluate the effectiveness of the incentive structure. All the GPs have been selected.

In terms of disaster risk reduction, Albania has established relevant laws, but the civil protection organization is not fully defined, limiting the effectiveness of post-earthquake planning. In this transitional phase, the absence of a well-structured civil protection framework presents a barrier to progress. The nation has selected guidelines aimed at improving its planning framework, such as the "Guidelines for planning and execution of civil protection drills" (GP19), "National seismic risk rescue program" (GP20), and "Resolution on the National Program for Protection against Natural and Other Disasters" (GP21). Multiple governmental bodies will oversee these guidelines, with national and IPA funds serving as key resources for monitoring progress and ensuring successful implementation.

Finally, earthquake insurance is not mandatory in Albania, and the lack of political interest has hindered the development of an effective insurance apparatus. There is a critical need for Albania to explore potential advantages for both the government and property owners, including investigating connections between insurance and emergency planning. Private insurance companies will be responsible for implementing these insurance solutions, with support from stakeholders including the Ministry of Finance and Economy and local municipalities. Regular assessments and monitoring strategies will be necessary to evaluate the effectiveness of insurance coverage as part of a comprehensive risk reduction framework.

### *4.2. Croatia*

Croatia's seismic risk reduction efforts are guided by Eurocode 8 and specific repair techniques for masonry buildings. However, the overall normative framework is considered procedurally inadequate, particularly due to its limited focus on the seismic vulnerability of existing buildings and seismic risk reduction for cultural heritage. Key barriers include a lack of standardized risk assessment procedures, skills, funding, and political interest. To address these issues, improvements to the existing policy framework are needed, such as the adoption of laws with specific interventions tailored for existing buildings and the reduction in seismic risk to cultural heritage. The Croatian Standards Institute has been cited as a key responsible entity, supported by universities, design professionals, and decision-makers, primarily through government and EU funding. Monitoring strategies are under development across various initiatives.

Croatia does not have a specific urban-level strategy for seismic vulnerability reduction, as it is hampered by funding limitations for macro-level assessments. However, local-scale building regulations are considered a potential solution. The Croatian Standards Institute and the government are responsible for their implementation. Engaging universities, design professionals, and decision-makers as stakeholders that might contribute to the process, again relying on government and EU funds, with monitoring strategies in place, is recommended.

Urban planning regulations in Croatia do not yet take into account seismic risk, cultural heritage protection, or sustainable development principles, mainly due to a lack of funding. Selected good practices for replication focus on urban strategies based on local seismic features (GP8) and emergency conditions (GP9b and GP9c). The Ministry of Urban Planning has been identified as the responsible entity, while various ministries, authorities, professional associations, and decision-makers have been cited as stakeholders. The main sources of funding for implementation are government and EU funds.

The creation of a framework for seismic incentives in Croatia is hampered by a lack of financial support, knowledge of the benefits, sustainable methods, and awareness of seismic risks. All the available GPs have been selected. The Ministry of Urban Planning, universities, and Civil Protection Services have been identified as responsible entities, along with a broader range of stakeholders, including design professionals and civil society organizations. Government and EU funds have been allocated to support the development of the framework, with monitoring strategies underway.

While Croatia has documents addressing seismic safety in all phases of preparation, the post-earthquake phases, and the protection of cultural heritage, it aims to improve its planning framework by replicating selected good practices, such as GP18, GP19, GP20, and GP21. The lack of a solid civil protection organization and limited political interest are potential obstacles. The Ministry of Urban Planning, universities, and Civil Protection Services are responsible for this improvement. Universities and design professionals should be engaged as stakeholders, and government and EU funds should be used as key resources. Monitoring strategies focus on preparedness activities and staff skills.

Finally, earthquake insurance in Croatia is not legally binding. Obstacles to improvement are a lack of political interest, awareness, economic resources, and data. Nevertheless, it is recommended to explore mandatory insurance in urban areas based on risk assessment. The government and banks could act as responsible entities, with various governmental bodies, citizens, and decision-makers engaged as stakeholders. Government funds, EU funds, and bank loans could be used for funding. The identified monitoring strategies focus on indicators and the definition of responsible entities.

### *4.3. Greece*

Greece uses a normative framework for seismic design and intervention, including Eurocode 8 and specific guidelines for masonry buildings. While these are considered sufficient for territorial vulnerability, some key components lack legal bindingness. Progress is hampered by procedural gaps, limited knowledge and economic resources for territorial risk assessment, and insufficient political interest. Improvements require updating legislation tailored to existing buildings and cultural heritage and aligning with regional risk reduction norms (GP6 and GP5). The Ministry of Infrastructure and Public Works has been cited as a key responsible actor, alongside the Greek Organization of Antiseismic Protection and the Ministry of Climate Change and Civil Protection, supported by OASP and funded by public investment, EU funds, and public–private partnerships. Monitoring strategies mainly focus on defining indicators.

Building regulations in Greece address the seismic vulnerabilities of existing structures, although further integration is needed. Local-scale regulations are considered crucial. The barriers to improvement are similar to those identified for seismic norms. The responsible entities are the same as for seismic norms, with the addition of the Ministry of Environment, while OASP and universities are stakeholders that could contribute. The funding sources and monitoring strategies are also identical.

Urban planning in Greece considers seismic risk, using tools such as geological suitability studies. However, progress is limited by procedural, knowledge, and economic resource gaps, as well as political will. Adopted solutions include urban strategies based on local seismic assessments and emergency conditions (GP9a). The Ministry of Environment and local authorities are responsible, with other municipalities and the Technical Chamber of Greece acting as stakeholders, relying on public investment, EU funds, and public–private partnerships. Monitoring strategies focus on setting indicators.

The development of a robust seismic incentives framework in Greece is hindered by insufficient political and financial support, limited communication capacity, and a lack of data; thus, the sustainability of any framework that is developed is not ensured. Selected good practices involve economic, financial (GP11), and knowledge-enhancing incentives (GP16 and GP17). The Ministries of Infrastructure and Public Works, Development, and Climate Change and Civil Protection, together with OASP, are the responsible bodies, with OASP, the Technical Chamber of Greece, and local municipalities acting as stakeholders. Funding sources are similar to the above. Monitoring strategies include indicator setting, responsible entity definition, and regular effectiveness reviews.

Post-earthquake planning in Greece is documented for the preparedness, emergency response, and rehabilitation phases (GP19). The improvement of this framework, potentially through the national seismic risk rescue program (GP20), is hampered by a lack of political interest and inter-authority coordination. The Ministries of Infrastructure and Public Works, and Climate Change and Civil Protection, along with OASP and local authorities, are the responsible bodies and stakeholders. The potential sources of financing comprise public investment, EU funding, and public–private partnerships. Monitoring strategies include defining indicators and conducting preparedness and recovery exercises.

Finally, earthquake insurance in Greece was not yet legally binding at the time of the study (i.e., between March 2020 and February 2023). However, it has recently been announced that from 1 January 2025, all buildings must be insured against natural disasters, including earthquakes. For those living in buildings without insurance, the government will not provide any compensation or assistance in the event of a disaster. So far, only 14% of houses are insured against earthquakes [37].

### *4.4. Italy*

Italy addresses seismic risk with a recognized normative framework, including Eurocode 8, which also considers cultural heritage and offers flexible intervention procedures. Although Italy's regulative apparatus is considered adequate, further improvements are deemed necessary through the adoption of additional European good practices, such as GP2, GP3, and GP4. A key challenge in enhancing the regulative framework is the lack of standardized procedures for and knowledge about territorial seismic risk assessment. The Italian state is the primary responsible actor; it engages practitioners, engineers, architects, and relevant ministries, and financing is provided by European and state funds. Monitoring focuses on defined indicators and responsible bodies.

Building regulations in Italy are decentralized at the municipal level and allow for context-specific interventions that focus on seismic risk reduction. Further enhancement is needed, but the lack of standardized procedures and knowledge to assess territorial seismic risk remains a barrier. Municipalities are responsible for regulatory improvements, and they should involve practitioners, civil servants, urban planners, and universities as key stakeholders. State resources have been identified as the main source of financing. Monitoring strategies focus on the identification of indicators and responsible entities.

The Emilia-Romagna region in Italy is pioneering the integration of seismic risk into urban planning through Regional Law No. 24/2017, which requires the inclusion of local seismic hazard, emergency condition, and microzonation analyses in new urban plans. Although this is considered a good practice (GP9a, GP9b, and GP9c), so far, only the geo-morphological aspects have been fully adopted.

Italy employs economic incentives ("Sismabonus"), which, in addition to volumetric incentives for urban regeneration in Emilia-Romagna, also offer tax deductions for seismic safety upgrades. Indirect awareness-raising campaigns also aim to educate citizens and students. The expansion of indirect incentives, such as the implementation of solutions such as GP12 and GP19, faces financial constraints. The Italian state and regional/local authorities are responsible, involving Civil Protection, practitioners, and citizens. The improvement could be funded by state resources, with monitoring strategies focusing on responsible entity identification, indicator definitions, and effectiveness reviews.

Post-earthquake planning in Italy is structured through national, regional, and municipal disaster risk management plans that prioritize cultural heritage. To further enhance preparedness, efforts should focus on replicating good practices in civil protection drills (GP19), although they may be hindered by a lack of political interest and insufficient inter-authority coordination. Civil Protection is the responsible entity; it should engage various state and local bodies, NGOs, rescue units, and citizens, with state and EU funds serving as financial support. Monitoring includes the definition of indicators, preparedness activities, and recovery exercises.

Finally, earthquake insurance is not a legal requirement in Italy, where it is associated with high premiums and inconvenience, compounded by a lack of political will to explore its potential. Recommendations include the consideration of mandatory insurance in urban areas based on risk assessment. Insurance companies are the responsible entities in this process, and they should involve policymakers, the Insurance Supervisory Authority, practitioners, citizens, and banks as stakeholders. Private insurance investments are the main source of financing, with monitoring strategies encompassing indicators, responsible entities, and regular reviews of insurance features and amounts.

### *4.5. Serbia*

Serbia's primary seismic norm is Eurocode 8 (GP1), which regulates structural design in seismic zones but lacks specific details for cultural heritage and only provides general procedures. Improving this framework faces obstacles such as a lack of established procedures and resources for assessing territorial seismic risk. Therefore, updates are needed, including the adoption of specific measures for existing buildings and cultural heritage. The Institute for Standardization of Serbia (ISS), together with relevant ministries and stakeholders such as national authorities and practitioners, is responsible for this. The main source of funding is the government, and monitoring strategies focus on indicators and responsible entity definitions.

Seismic vulnerability is not a central aspect of Serbia's building regulations. Although local-scale regulations for seismic risk reduction are seen as a potential improvement, progress is hampered by similar issues to those affecting seismic standards: a lack of procedures and funding for risk assessment at both territorial and macro levels, coupled with limited expertise. The Ministries of Construction and Education, along with various stakeholders, are responsible for enhancing building regulation frameworks, and they should primarily rely on government funds. They should also define monitoring indicators and responsible entities.

Urban planning regulations in Serbia currently do not take into account seismic risk, cultural heritage protection, or sustainable development principles. The development of a more comprehensive framework is hampered by a lack of established procedures, skills, and financial resources for seismic risk evaluation at the territorial level, along with limited political will. The proposed solutions include the adoption of urban strategies and plans based on local seismic risk assessment, considering geological suitability (GP8) and emergency conditions (GP9a, GP9b, and GP9c). The Ministry of Urban Planning, other relevant ministries, and other stakeholders are responsible for this, with government funds serving as the primary resource. Monitoring strategies include the definition of indicators and responsible entities.

In Serbia, there are currently no specific incentives for earthquake preparation. The development of an effective incentive framework is hindered by insufficient financial resources, limited awareness of its benefits, the absence of sustainable methods, and low public awareness of seismic risk. The Ministries of Construction, Transport and Infrastructure, the Ministry of Culture, and the Ministry of Finance are identified as responsible for the process, and they should involve local authorities, the business sector, and citizens as stakeholders. Government funds and potential international aid are considered appropriate resources. Monitoring strategies focus on responsible entity identification, indicator definitions, and effectiveness reviews.

Post-earthquake planning in Serbia is underdeveloped, lacking specific documentation and a clear framework. A significant barrier to improvement is the absence of a designated national-level responsible entity. The proposed solution involves adopting all of the following GPs: GP18, GP19, GP20, and GP21. The Ministry of Interior and the Republic Directorate for Property of the Republic of Serbia are suggested as responsible entities, and should involve other ministries, local authorities, and civil society organizations as stakeholders. Government funds and potential international aid are key resources. Monitoring strategies include the definition of indicators and related responsible entities, preparedness activities, and recovery exercises.

Earthquake insurance in Serbia is not a legal requirement. The low adoption rate is attributed to a lack of awareness, affordability, and perceived necessity. To address this, it is recommended to explore mandatory or voluntary insurance schemes, risk-pooling mechanisms, and awareness campaigns. The Ministry of Finance and the banking sector are two of the identified responsible entities, and they should involve insurance companies, banks, and citizens as stakeholders, with private funds and potential government subsidies serving as relevant resources. Monitoring strategies include indicators definition, identification of responsible entities, and regular reviews of insurance features and amounts.

### *4.6. Slovenia*

Slovenia's primary seismic norm is Eurocode 8, which focuses on structural design but needs specific guidelines on cultural heritage protection. Improvement is hindered by limited technical knowledge and political interest. Potential solutions involve comprehensive legal frameworks (GP2, GP3, GP4, GP5, GP6, and GP7), with the Slovenian Institute for Standardization identified as the responsible actor. Monitoring indicators and entities should also be defined.

Building regulations in Slovenia generally address seismic vulnerability in terms of ensuring mechanical stability and resistance, but do not include detailed intervention plans for existing structures. Local-scale regulations are the key for improvement, but they face challenges in terms of economic resources and political interest. The Ministry of the Environment and Spatial Planning is responsible for the improvement. Monitoring strategies focus on indicators and responsible entity definitions.

Urban planning in Slovenia refers to seismic risk only to a very limited extent; therefore, it requires a more robust framework, the construction of which is made challenging due to limited resources and technical expertise. The adoption of urban strategies based on seismic assessment (GP8 and GP9c) is planned. The responsible entity for urban planning framework improvement is the same as that identified for building regulation.

Slovenia's limited seismic incentives face challenges in resources and awareness. Establishing effective incentives involves direct (GP11 and GP14) and indirect (GP10) mechanisms, with the Ministries of Environment and Defense acting as the responsible entities. Monitoring strategies focus on indicators, entities, and the effectiveness of incentives.

Post-earthquake planning in Slovenia is covered by national disaster programs but lacks a specific cultural heritage focus. Limited political interest hinders further development, with a focus on enhancing existing laws. The Ministry of Defense is considered the responsible body for improvement. Monitoring involves the definition of indicators and entities, preparedness activities, and recovery exercises.

Earthquake insurance in Slovenia is non-mandatory; it is considered costly and inconvenient. A lack of political interest and public awareness hinders the development of an effective system. Exploring mandatory schemes and enhancing awareness are proposed solutions, with the government suggested as the responsible body. Monitoring strategies focuses on indicators, the identification of responsible entities, and regular reviews of insurance features.

National public authorities, training centers, higher education institutions, the research sector, and practitioners have been identified as key stakeholders in the improvement of Slovenia's policy and planning framework. In the context of enhancing seismic incentives, insurance, and post-earthquake planning, Slovenia has also identified property owners as relevant stakeholders. Insurance companies are included among the stakeholders, specifically in relation to earthquake insurance.

The primary sources of funding for improving the policy framework are government and EU funds.

### *4.7. Trend Analysis Across Countries*

By interpreting the results across countries, key differences emerge, and two different scenarios can be delineated. On the one hand, Italy and Greece demonstrate a more advanced situation in terms of instruments and practices in place to deal with seismic risk reduction compared to the other countries. Indeed, the majority of good practices come from these two countries, which serve as role models for seismic risk reduction in historic areas for the majority of the investigated topics. On the other hand, Croatia, Albania, and Serbia show the highest potential for improvement, thanks to the identification of many foreign good practices considered as suitable to be replicated in their own contexts. Slovenia presents an intermediate situation. While many GPs were selected for replication to improve the seismic norms apparatus, only a few from other categories were considered, largely because similar practices are already in place. Consequently, different paces emerge for enhancing urban resilience, as well as different priorities of interventions, which are context-specific and depend on the country's initial conditions.

Shared challenges have also been identified for topics that are less explored in the context of seismic risk reduction, particularly building regulations and seismic incentives. For the latter, raising awareness among both governments and building owners about the possible advantages of implementing seismic insurance is a priority across all countries. In terms of building regulations, there is a need for all countries to improve their instruments by endorsing seismic risk assessment at the urban and territorial levels. This would enable

a more comprehensive understanding of seismic risk and support the development of tailored regeneration strategies for historic urban areas.

## 5. Conclusions

This research highlights the importance of providing evidence-based guidance to policymakers on how to transition from identifying suitable solutions to implementing practical measures aimed at reducing seismic vulnerability, with a special focus on historic areas. Moreover, by applying a common investigation methodology to six case studies across six countries in the Adriatic–Ionian region (i.e., Albania, Croatia, Greece, Italy, Serbia, Slovenia), it has contributed to reinforcing the added value of territorial cooperation between entities sharing common challenges.

A three-phase methodology was designed and applied in the framework of the EU-funded ADRISEISMIC project. It started with the identification of GPs by involving all case studies, then assessed the potential of replicability and scalability of the foreign GPs in each case study, in order to highlight the barriers and obstacles to their implementation in the local contexts. Finally, the GPs served to build a tailored roadmap for each case study, which is considered a step-by-step strategic tool aiming at improving the policy and planning framework to strengthen local responses and reduce seismic vulnerability at the urban scale. The outcomes of the three phases (e.g., GP identification, GP assessment in terms of replicability and scalability, roadmaps) were validated through a series of local workshops organized by each case study.

The innovative aspect of the roadmap design is the operational and schematic approach used. In order to assist and facilitate countries in analyzing and improving the policy and planning framework, each step consists of a list of options to be selected or some short open questions to be answered, according to the different situations of each territory. Thanks to its well-structured and flexible form, the diagram guides the case studies in finding the gaps, identifying the best solutions, and defining the operations to be implemented. The ultimate step—not reported by this investigation—consists of the definition of action plans as political commitments to turn the roadmaps into actual changes to the current policy and planning systems. The methodology also contributed to the identification of trends between different countries sharing similar challenges with seismic risk reduction, as well as key challenges and common barriers for enhancing the resilience of historic Adriatic–Ionian areas.

The cooperation of territorial actors represented a sustainable pathway for demonstrating the validity and replicability of the identified results, thus strengthening their transferability to the local contexts. Involving the relevant stakeholders from the very beginning of the project, and consulting them once the project result was achieved, allowed us to build a solid network. The stakeholders supported the operationalization of knowledge on seismic vulnerability and the capitalization of current good experiences, ensuring the transfer from research to practice. In addition, for the public authorities involved in the case studies, the workshops constituted a valuable way of engaging a multi-disciplinary team to design their tailored roadmaps toward seismic vulnerability reduction.

In terms of future research trends, it emerged that the topic of seismic incentives requires a different approach in order to be adequately addressed and needs to be further discussed. Exploring the possibility of connecting to the emergency planning and preparedness phases and establishing priorities for establishing mandatory insurance in selected urban areas based on the outcomes of a large-scale urban seismic risk assessment opens the debate regarding future research paths. In this regard, the role of digital technologies as potential tools to run expeditious assessment methodologies could also be further investigated.

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**Informed Consent Statement:** Informed consent was obtained from all subjects involved in the study.

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## Abbreviations

The following abbreviations are used in this manuscript:

| | |
|---|---|
| ADRION | Adriatic–Ionian (Region) |
| GPs | Good Practices |
| SMEs | Small and Medium Enterprises |
| NGOs | Non-Governmental Organizations |
| CLE | Emergency Limit Condition |
| MS | Seismic Microzonation |

# Appendix A

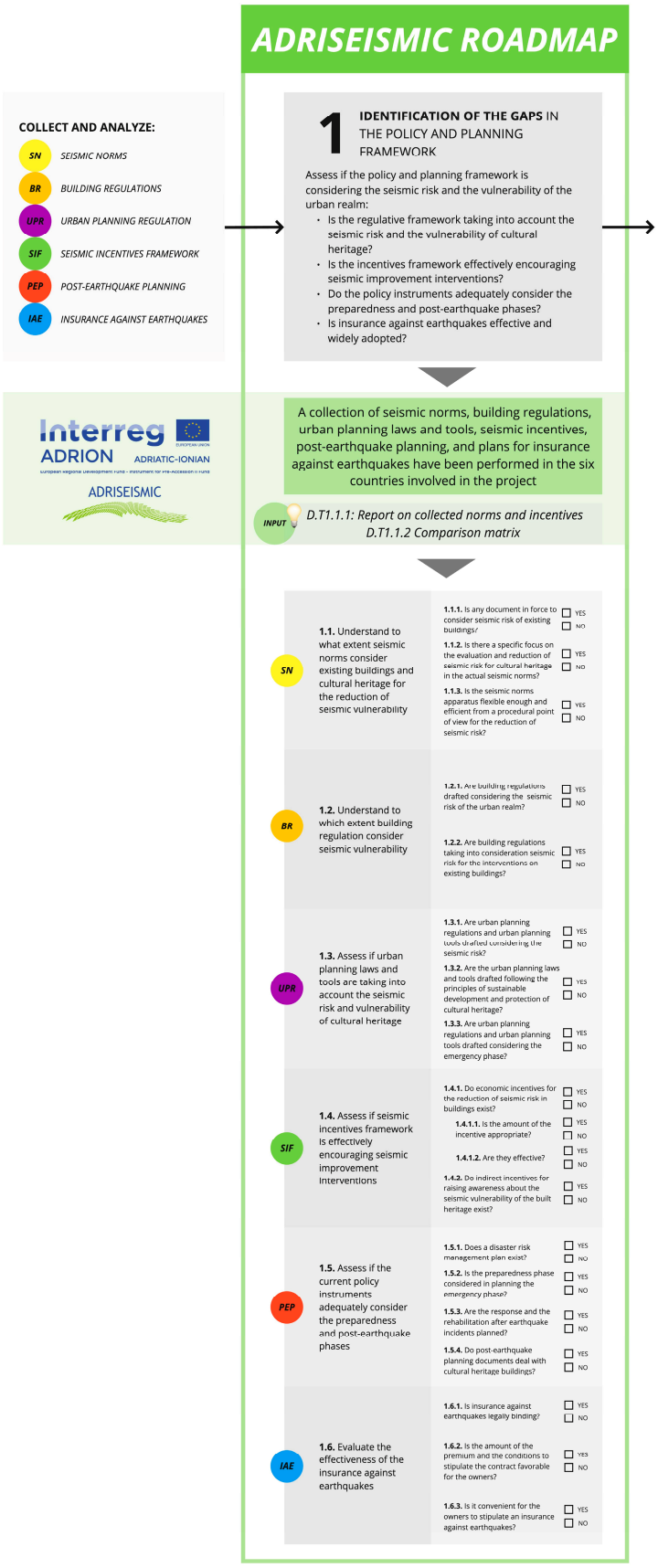


**Figure A1.** ADRISEISMIC roadmap, Step 1.

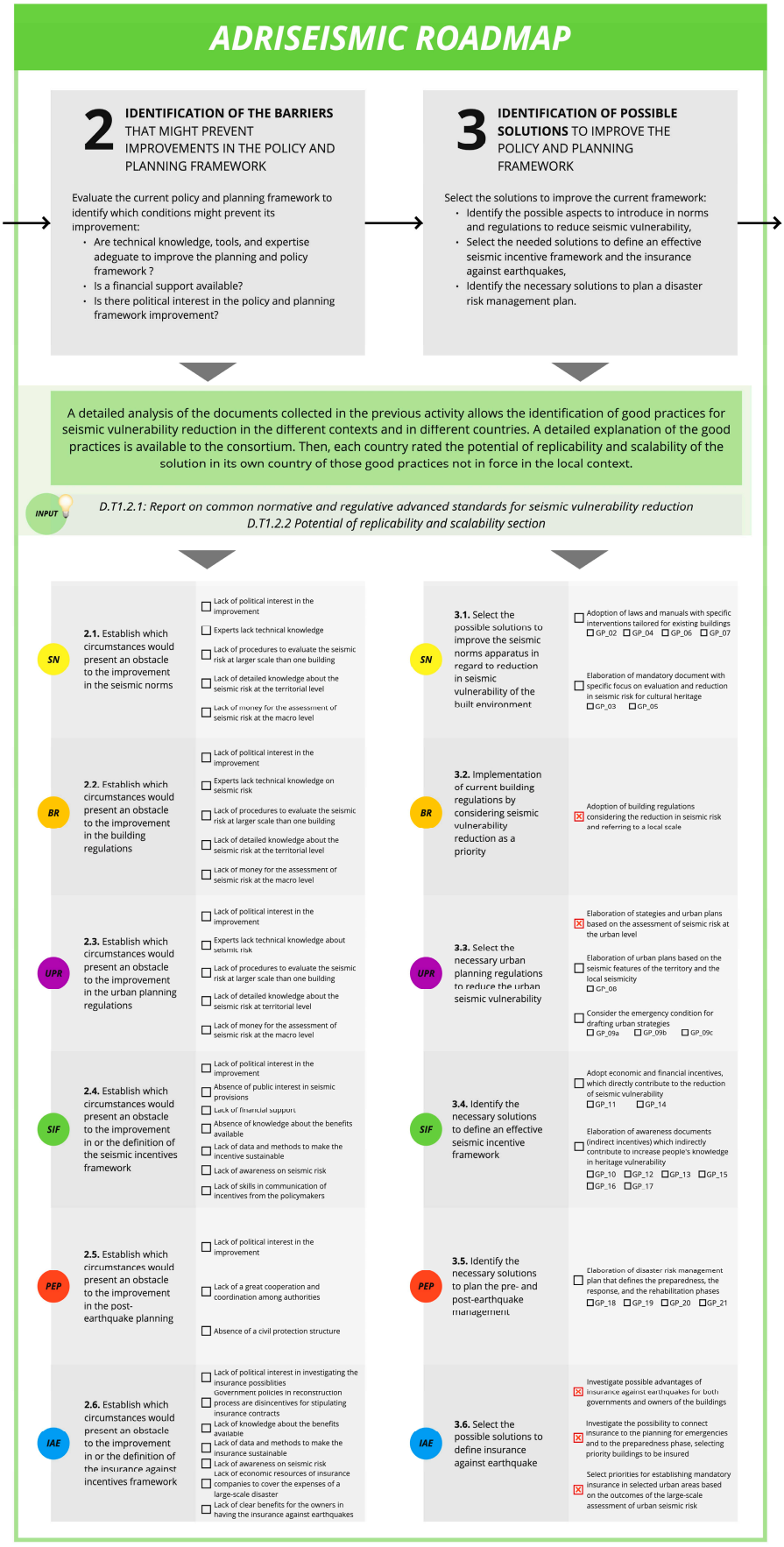


**Figure A2.** ADRISEISMIC roadmap, Steps 2 and 3.

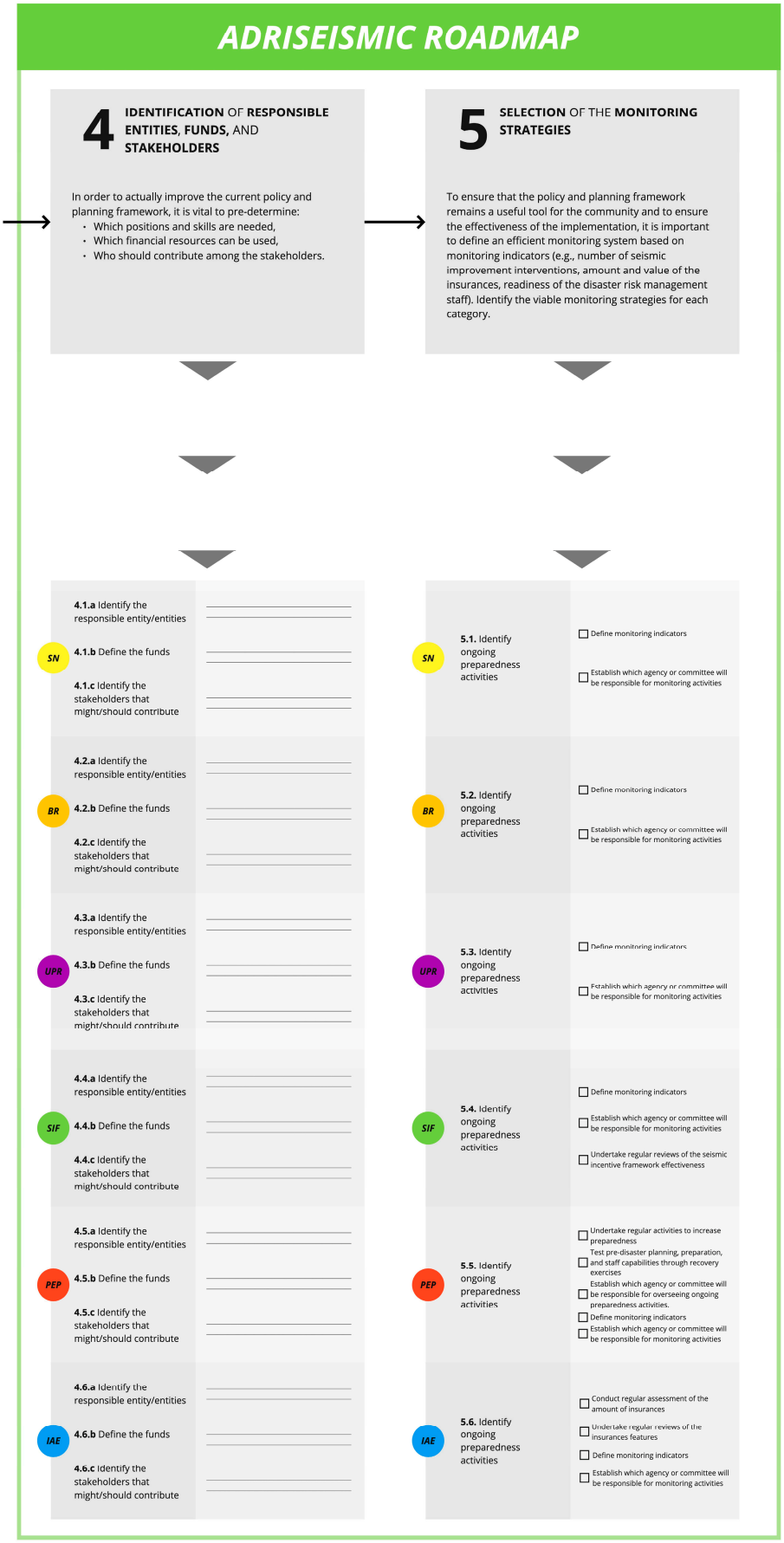


**Figure A3.** ADRISEISMIC roadmap, Steps 4 and 5.

**Table A1.** Results from ADRISEISMIC roadmap, Step 4. a. Identify the responsible entity/entities. b. Define the funds. c. Identify the stakeholders that might/should contribute.

| Topic | | Albania (AL) | Croatia (HR) | Greece (GR) | Italy (IT) | Serbia (RS) | Slovenia (SI) |
|---|---|---|---|---|---|---|---|
| Seismic norms | a | Scientific Council of the Ministry of Infrastructure and Energy | Croatian Standards Institute | Ministry of Infrastructure and Public Works, Ministry of Climate Change and Civil Protection, Greek Organization of Antiseismic Protection (OASP) | Italian state | Institute for Standardization of Serbia (ISS), Ministry of Construction, Transport and Infrastructure, Ministry of Culture, Ministry of European Integration | Slovenian Institute for Standardization |
| | b | National and IPA funds | Government and EU funds | Public Investment Program, EU funds, private funds via public–private sector cooperation programs | EU funds and state resources | Government funds | Government and EU funds |
| | c | Academia, Technical Chamber | Universities, design professionals, decision-makers | Greek Organization of Antiseismic Protection (OASP) | Practitioners, boards of engineers and architects, ministries | National public authority (Ministry of Construction, Transport and Infrastructure, Ministry of Culture, Ministry of European Integration); higher education and research (civil engineers, restaurateurs, architects); practitioners (civil engineers, restaurateurs, architects) | National public authority (Ministry of the Environment and Spatial Planning, Ministry of Culture); training centers (Slovenian Chamber of Engineers); higher education and research (civil engineers, restaurateurs, architects); practitioners (civil engineers, restaurateurs, architects) |

**Table A1.** *Cont.*

| Topic | | Albania (AL) | Croatia (HR) | Greece (GR) | Italy (IT) | Serbia (RS) | Slovenia (SI) |
|---|---|---|---|---|---|---|---|
| Building regulations | a | Ministry of Culture and Ministry of Urban Development | Croatian Standards Institute, government | Ministry of Infrastructure and Public Works, Ministry of Climate Change and Civil Protection | Municipalities | Ministry of Construction, Transport and Infrastructure, Ministry of Culture | Ministry of the Environment and Spatial Planning |
| | b | National and IPA funds | Government and EU funds | Public Investment Program, EU funds, private funds via public–private sector cooperation programs | State resources | Government funds | Government and EU funds |
| | c | Structural Engineers and Architects | Universities, design professionals, decision-makers | Greek Organization of Antiseismic Protection (OASP), universities | Practitioners, civil servants, urban planners, universities, citizens | National public authority (Ministry of Construction, Transport and Infrastructure, Ministry of Culture, Ministry of European Integration); higher education and research (civil engineers, restaurateurs, architects); practitioners (civil engineers, restaurateurs, architects, urban planners) | National public authority (Ministry of the Environment and Spatial Planning, Ministry of Culture); training centers (Slovenian Chamber of Engineers); higher education and research (civil engineers, restaurateurs, architects); practitioners (civil engineers, restaurateurs, architects, urban planners) |

**Table A1.** *Cont.*

| Topic | | Albania (AL) | Croatia (HR) | Greece (GR) | Italy (IT) | Serbia (RS) | Slovenia (SI) |
|---|---|---|---|---|---|---|---|
| Urban planning regulations | a | Ministry of Culture and Ministry of Urban Development | Ministry of Urban Planning | Ministry of Environment, local region, local municipality | Municipalities | Ministry of Construction, Transport and Infrastructure, Ministry of Culture | Ministry of the Environment and Spatial Planning |
| | b | National and IPA funds | Government and EU funds | Public Investment Program, EU funds, private funds via public–private sector cooperation programs | State resources | Government funds | Government and EU funds |
| | c | Engineers, architects, administration employees, etc. | Universities, design professionals, decision-makers, civil society organizations | Other municipalities, Technical Chamber of Greece—Local Section | Practitioners, civil servants, urban planners, universities, citizens | National public authority (Ministry of Construction, Transport and Infrastructure, Ministry of Culture, Ministry of European Integration); higher education and research (civil engineers, restaurateurs, architects); practitioners (civil engineers, restaurateurs, architects, urban planners) | National public authority (Ministry of the Environment and Spatial Planning, Ministry of Culture); training centers (Slovenian Chamber of Engineers); higher education and research (Urban Planning Institute of the Republic of Slovenia, civil engineers, restaurateurs, architects); practitioners (civil engineers, restaurateurs, architects, urban planners) |

**Table A1.** *Cont.*

| Topic | | Albania (AL) | Croatia (HR) | Greece (GR) | Italy (IT) | Serbia (RS) | Slovenia (SI) |
|---|---|---|---|---|---|---|---|
| Seismic incentive framework | a | Assembly of the Republic of Albania | Ministry of Urban Planning, universities, Civil Protection Services | Ministry of Infrastructure and Public Works, Ministry of Development, Ministry of Climate Change and Civil Protection, Greek Organization of Antiseismic Protection (OASP) | Italian state, regional and local authorities | Ministry of Construction, Transport and Infrastructure, Ministry of Culture, Ministry of Finance, Republic Directorate for Property of the Republic of Serbia | Ministry of the Environment and Spatial Planning, Ministry of Defence |
| | b | National and IPA funds | Government and EU funds | Public Investment Program, EU funds, private funds via public–private sector cooperation programs | State resources | Government funds | Government and EU funds |
| | c | Government, Ministry of Civil Protection, Council of Ministers, Ministries, National Agency of Civil Protection, municipalities | Universities, design professionals, decision-makers, civil society organizations | Greek Organization of Antiseismic Protection (OASP), Technical Chamber of Greece—Local Section, local municipalities | Civil Protection, public authorities, practitioners, citizens | Ministry of Construction, Transport and Infrastructure, Ministry of Culture, Ministry of Finance, Republic Directorate for Property of the Republic of Serbia, occupational safety authority, architects, civil engineers, restaurateurs, architects, property owners | Ministry of the Environment and Spatial Planning; Ministry of Defence, Ministry of Culture, municipalities, Faculty of Architecture, Faculty of Civil Engineering, research institutes, Slovenian Chamber of Engineers, education/training centers and schools, urban planners, civil engineers, restaurateurs, architects, property owners |

**Table A1.** *Cont.*

| Topic | | Albania (AL) | Croatia (HR) | Greece (GR) | Italy (IT) | Serbia (RS) | Slovenia (SI) |
|---|---|---|---|---|---|---|---|
| Post-earthquake planning | a | Assembly of the Republic of Albania | Ministry of Urban Planning, universities, Civil Protection Services | Ministry of Infrastructure and Public Works, Ministry of Climate Change and Civil Protection, OASP, local municipalities, local regions | Civil Protection | Ministry of Interior, Republic Directorate for Property of the Republic of Serbia | Ministry of Defence |
| | b | National and IPA funds | Government and EU funds | Public Investment Program, EU funds, private funds via public–private sector cooperation programs | EU funds and state resources | Government funds | Government and EU funds |
| | c | Government, Ministry of Civil Protection, Council of Ministers, ministries, National Agency of Civil Protection, municipalities | Universities, design professionals | OASP, municipalities, local regions | State, regions, provinces, municipalities, NGOs, rescue units, citizens | National public authority (Ministry of Construction, Transport and Infrastructure, Ministry of Interior, Republic Directorate for Property of the Republic of Serbia); higher education and research (occupational safety authority, civil engineering); practitioners (civil engineers, restaurateurs, architects, urban planners); general public (property owners) | Ministry of the Environment and Spatial Planning, Ministry of Defence, Ministry of Culture, Faculty of Architecture, Faculty of Civil Engineering, education/training centers and schools, enterprises, SME, urban planners, civil engineers, restaurateurs, architects, property owners |

**Table A1.** *Cont.*

| Topic | | Albania (AL) | Croatia (HR) | Greece (GR) | Italy (IT) | Serbia (RS) | Slovenia (SI) |
|---|---|---|---|---|---|---|---|
| Insurance against earthquakes | a | Private insurance companies | Government, banks | Ministry of Infrastructure and Public Works, Ministry of Development, Ministry of Climate Change and Civil Protection | Insurance companies | Ministry of Finance, Republic Directorate for Property of the Republic of Servia, banking sector | Government |
| | b | Insurances funds, national funds | Government resources, EU funds, and bank loans | Private funds | Private investments of insurance companies | Government funds | Government and EU funds |
| | c | Ministry of Finance and Economy, owners of vulnerable historic buildings, municipalities, etc. | Government, ministries, city stakeholders, decision-makers | Union of Insurance Consultants | Policymakers, Insurance Supervisory Authority (IVASS), practitioners, citizens, banks | National public authority (Ministry of Construction, Transport and Infrastructure, Republic Directorate for Property of the Republic of Serbia, Ministry of Culture, Ministry of Finance); insurance companies; higher education and research; practitioners (urban planners, civil engineers, restaurateurs, architects); general public (property owners) | National public authority (Ministry of the Environment and Spatial Planning, Ministry of Culture, Ministry of Finance); higher education and research; enterprises (insurance companies); practitioners (urban planners, civil engineers, restaurateurs, architects); general public (property owners) |

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