

Geoenvironmental Disaster Reduction

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Citizens' Observatories on Geohazards

Lessons from Five Pilots

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Presentation of the Citizens' Observatory Pilots

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8.1 Introduction

The AGEO project aims to implement five pilots of citizen observatories to improve the monitoring and management of natural hazards in the Atlantic Arc Area, through active participation of stakeholders, local communities and citizens in multiple aspects of risk assessment and

prevention. These will be referred to as “pilots” in the following.

The five pilot observatories are located along the Atlantic Arc (Fig. 8.1):

- Citizen’s observatory of vulnerability to coastal risks of erosion and marine flooding in Brittany, France
- Multi-hazard Citizens’ Observatory in Lisbon, Portugal
- Citizens’ Observatory on Rockfall and Rockfall Triggers in the Canary Islands, Spain

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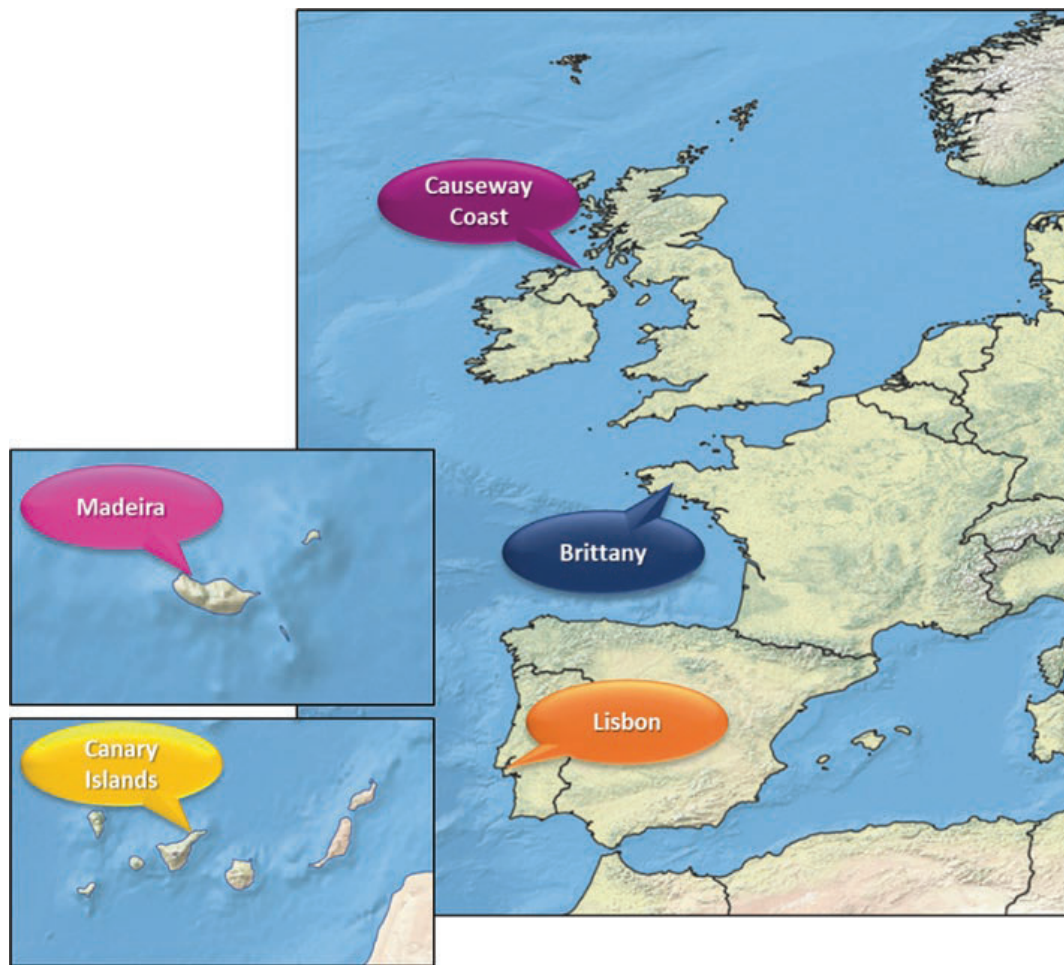


Fig. 8.1 Location of the five pilot observatories of AGEO

- Citizens' Observatory on Rockfall and Rockfall Triggers in the Causeway Coast, Northern Ireland
- Multi-hazard Citizens' Observatory on Madeira Island, Portugal.

These pilots constitute a representative panel of different hazards, stakes and risk situations for the populations at the scale of the Atlantic Arc, responding in this way to the priorities of the INTERREG program. This set of pilot observatories also includes remote or isolated territories where data is typically lacking due to the absence of systematic collection of reference data, and despite the high occurrence of natural risks. AGEO aims to involve local communities through participatory science tools in order to improve the collection of scientific data for decision-aid and awareness raising purposes. The use of European Copernicus services, based

on satellite imagery, has been examined, both to assess their potential for hazards monitoring and to improve risk management methods (see Chap. 4). Above all, the main objective of pilots of AGEO is to adopt common approaches to share information between local citizen communities, natural hazard managers, emergency services and decision-makers in order to strengthen risk monitoring and risk management systems.

8.2 Methods for the Self-Characterization of the Pilot Observatories

Definition of the pilots' objectives: workgroups, brainstorming, mind maps
The observation of geohazards is a vast domain. It is therefore not surprising that there is great diversity among the pilot observatories of AGEO. In order to be

able to identify relevant axes of harmonization and to structure a collaborative roadmap while respecting the specificities of each pilot, all partners have engaged in collaborative work, including through hazard-specific working groups. Following several approaches for self-characterization has allowed each pilot could to define its objectives, means, constraints and ambitions in a homogeneous framework. Brainstorming sessions on this topic have taken place at multiple occasions throughout the beginning of the project, during consortium meetings and conference calls.

The first step was to agree on a broad, **inclusive definition of observatories** and to understand the expectations and needs of each of the partners in relation to AGEO. In the framework of AGEO, geohazard observatories aim to:

- (i) improve and capitalise on **knowledge of hazards and exposure** through long-term monitoring and **data dissemination**;
- (ii) improve **risk management and prevention** by involving different stakeholders and providing tools to help **decision-making**;
- (iii) contribute to the improvement of the **risk culture** by involving citizens in monitoring and/or by providing them with information materials.

Then, during an online collaborative exercise of mind mapping, AGEO partners identified more specific objectives shared among all pilots:

- monitoring hazards and defining measurement protocols (data collection)
- use of Copernicus services and other Earth Observation tools (development of product and services)
- building/maintaining partnerships with local authorities and other stakeholders
- providing standardised data for the public authorities responsible of risk management
- providing access to documentary resources and/or results through a dedicated web portal
- leading/animating groups of natural risk management professionals and citizens

- providing expertise in civil engineering or support for the risk management policies at local scale
- proposing training sessions and awareness-raising measures
- setting up warning systems

For each of these points, the pilots were able to specify the action plan they intended to deploy during AGEO.

8.2.1 Survey and Semi-Directive Interviews

Taking into account the differences among pilots regarding their development stage, stakeholders configuration, and even the approach envisioned for citizen participation, a survey consisting of 56 questions was proposed to the pilot observatories' teams, to better identify the specificities of each observatory. It was structured along the following lines:

- Governance
- Types of territory concerned (area, population, environment, etc.)
- Types of risk and the dynamics of hazards,
- Main objectives of the observatory,
- Means of observation,
- Tools for data dissemination,
- Modalities of citizens' involvement,
- Target audiences (managers, inhabitants, tourists, emergency services),

These topics are common to all the pilot observatories of AGEO, therefore making inter-comparisons possible when analysing the answers to the survey.

Based on the feedback from the mind map session and the survey, a series of semi-directive individual interviews was conducted with each of the pilots, lasting approximately one hour and consisting of 16 questions. The goal was to expand on the results of the survey by clarifying certain answers and getting quantitative information, in order to gain a better understanding

of the goals, functioning, and activities of the pilot observatories.

8.2.2 Classification Matrix of Observatories

The analysis of the information collected through these various means confirmed the differences in configuration and operating modes among AGEO pilots. The observation strategies and the means deployed vary from one pilot to another, which stems from the difference in their goals and also in the type of stakeholders they preferentially interact with.

In order to synthesize these results on self-characterization, the matrix initially elaborated by OSIRISC team (Philippe & Hénaff, 2021) is adapted to suit the wider scope of AGEO's observatories. The underlying classification scheme and the matrix representation offers a very visual approach, similar to a QR-code, to identify the preferred lines of action and operating methods of an observatory (Fig. 8.2).

The matrix is of dimensions 4×4 . It is not intended as a rating of the quality or efficiency of an observatory, but as a way of highlighting priority areas and operating methods at a given time. Cells in the matrix describe possible actions the observatory may undertake. Results of the self-characterization study are capitalized by colouring the cells corresponding to the objectives of each observatory. Checked cells will draw a pattern, allowing a visual identity to emerge, which can eventually lead to identifying different types of observatories. Short text descriptions provide details on the activity undertaken in the coloured cell. The columns represent different operational areas of the observatory. The “geo-risks” column contains actions related to hazards monitoring and risk assessment. The columns “Risk managers”, “Citizens of the territory” and “Emergency service” are meant to describe the involvement of the observatory with the different stakeholders, and whether the observatory is engaged in actions relevant for these stakeholders. The more coloured cells a column contains, the more this axis of activity is favoured by the observatory.

		Who/what does your pilot interact with?			
		Geo-risks	Risk management stakeholders	Citizens of the territory	Emergency services
- Increasing involvement +	Collecting data	Training	Informing	Monitoring risks, setting up warning systems	
	Standardizing & validating data	Advising on monitoring and risk management projects and policies	Participating in projects and events	Conducting drills for a general audience	
	Developing products and services	Expertising risk management projects and policies (local authorities or State)	Following territory projects	Providing support regarding decisions to organize crisis management	
	Assessing geodynamics / risks assessment	Risk management planning (works, restoration...)	Leading / coordinating a community, citizen networks	Managing the deployment of protection and emergency response resources	

Fig. 8.2 Standard classification matrix of the citizen observatories of AGEO

The rows define how far toward risk management the pilot is going with respect to each operational area:

- The upper rows of the matrix correspond to observation goals and awareness-raising among the various audiences,
- The further down in the matrix, the more the pilot goes beyond data collection and dissemination, by exploiting the data into products and services and engaging further with stakeholders, eventually to carry out operational missions to assist in decision-making and risk management.

The matrices therefore summarise the main actions carried out by the pilots, their working partners, and the relations with stakeholders. The cells left blank may appear as possible evolutions of the pilot observatory.

8.2.3 Identification of Action Levers

Building upon the results of the self-characterization, action levers were proposed to the AGEO pilot observatories in order to define common tools to strengthen citizen involvement and improve outputs for risk management.

Actions that emerged as priorities are:

- participative science tools (including the design of the AGEO smartphone application),
- raising public awareness,
- data sharing (development of AGEO platform) and eventually considering early-warning alert procedures
- the definition of indicators to quantify the risk.

As the project progressed and through ongoing discussions within the consortium, the pilots have updated their roadmaps, adding complementary actions.

8.3 Presentation of the Citizens' Observatory Pilots of AGEO Project: A Diverse Set of Pilots

The mind map produced less than a year after the start of AGEO project gave an overview of the aspirations any initial steps of each pilot (the formatted original mind map is shown in Fig. 8.3). The pilots' objectives have evolved since then, adapting to the implementation constraints and drawing inspiration from other AGEO pilots.

In order to have a synthetic presentation of the characteristics of each pilot observatory, the following "identity cards" have been produced from the results of the interviews and surveys (Fig. 8.4).

The pilots address different types and intensities of hazards, some pilots being "multi-hazards". Their spatial coverage, configurations and the degree of exposure of the infrastructures and human lives vary from one territory to another. From the surveys and interviews, it also appears that different types of structures are in charge of the implementation and coordination of the observatories. The five pilots also have various degrees of maturity (Fig. 8.5), the observatories in Brittany and Lisbon being more than 10 years old, while the pilots in the Canary Islands, Causeway Coast and Madeira have been initiated as observatories during the project.

With regards to the geohazards monitored by the AGEO pilots, the needs for measurements and the approaches for managing the associated risks will depend on the kinematics of these hazards. The Fig. 8.6 classifies these geohazards along two axes: one axis for the sudden nature of the process (from slow to rapid) and one axis for the duration of the event (from transient to long term). For example, the more sudden the hazard, the higher the need for an early-warning system, while the duration of the process will have a greater influence on the

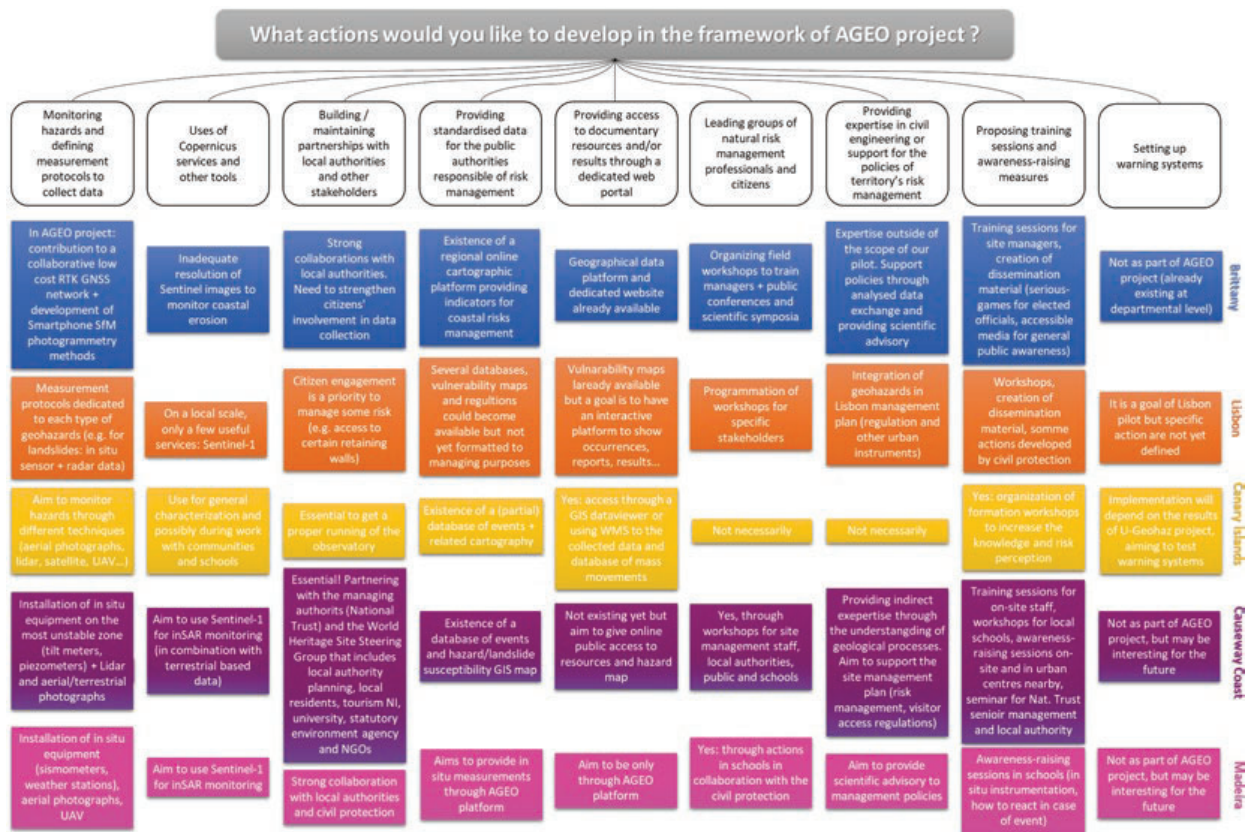


Fig. 8.3 Formatted results of the mind map exercise identifying the actions that the pilots intended to developed

timeframe of application of envisioned management policies.

The strategy of the pilot observatory will vary according to the size of the area affected by the hazards, but also the type of environment at risk: rural, natural or densely built-up zone, presence of natural or cultural heritage among the exposed elements on the territory (Fig. 8.7). The AGEO pilots again show a great diversity in the types of environments exposed, from very densely populated and with a rich cultural heritage as Lisbon to almost uninhabited but with a very high number of visiting tourists attracted by the natural heritage as the Causeway Coast.

Given these disparities in the size of the territory, the type and kinematics of the hazards and the type of environment, AGEO pilots obviously use different methods, tools and protocols to monitor their risks (Fig. 8.8). The survey showed that all pilots use (or are about to use) satellite imagery, whether from Copernicus or other Earth Observation (EO) services. The use of aerial or terrestrial photographs is also

common to all pilots for the collection of in situ data. This information has contributed to guiding the development of the AGEO citizen science application around a reporting system based on taking geolocalized pictures.

The goals, operating methods and resources dedicated to risk observation are different from one pilot to another because they depend mainly on the exposed elements (human beings, economic assets, infrastructure, natural or patrimonial sites, etc.) and the stakeholders (civil society, local communities, civil protection, etc.) working with the AGEO pilot teams.

The interest of different stakeholders in the results of the AGEO pilots was also the subject of a survey sent to the pilots (Fig. 8.9). This survey shows that local authorities and communities are very concerned about these geo-monitoring issues. The role of civil protection and the interest of private structures are less significant for the more rural territories or natural areas, whereas they increase in the most urbanised areas.



Fig. 8.4 Identity cards of AGEO pilot observatories in Brittany, Lisbon, Canary Islands, Causeway Coast and Madeira



Fig. 8.4 (continued)

The pilots are all convinced of the importance of dissemination toward citizens to increase risk awareness. They are all engaged in outreach and training activities for public authorities, managers or citizens. Depending on the pilot and the stakeholders, these activities take different forms, ranging from an advisory role for risk management authorities to communication via social networks.

Finally, it can be noted that the financial and human resources available are different from

one pilot to another, but can also change over time. Indeed, depending on the governance of the pilot observatories, some may have difficulty in finding recurrent funding. It is essential to establish formal partnerships with public authorities, to ensure the sustainability of the pilots through political support.

A comparative analysis of the matrices obtained for the various pilot observatories makes it possible to identify those whose missions are identical or very similar (Fig. 8.10).

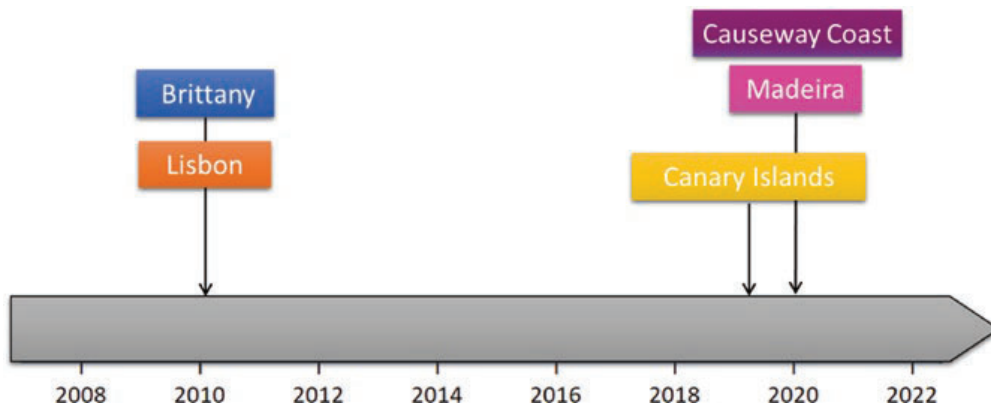


Fig. 8.5 Date of creation of the different pilot observatories

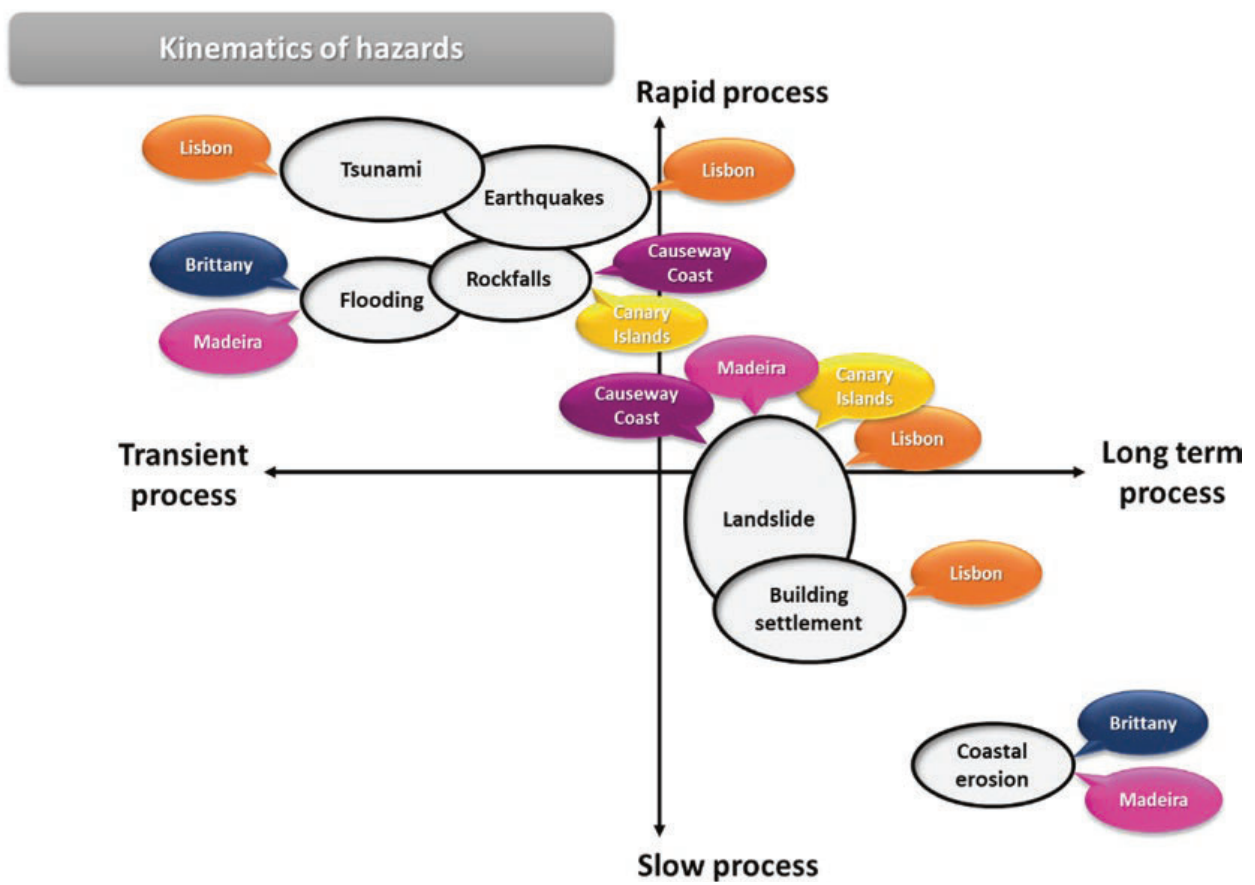


Fig. 8.6 Kinematics of the geohazards monitored by the AGEO pilots

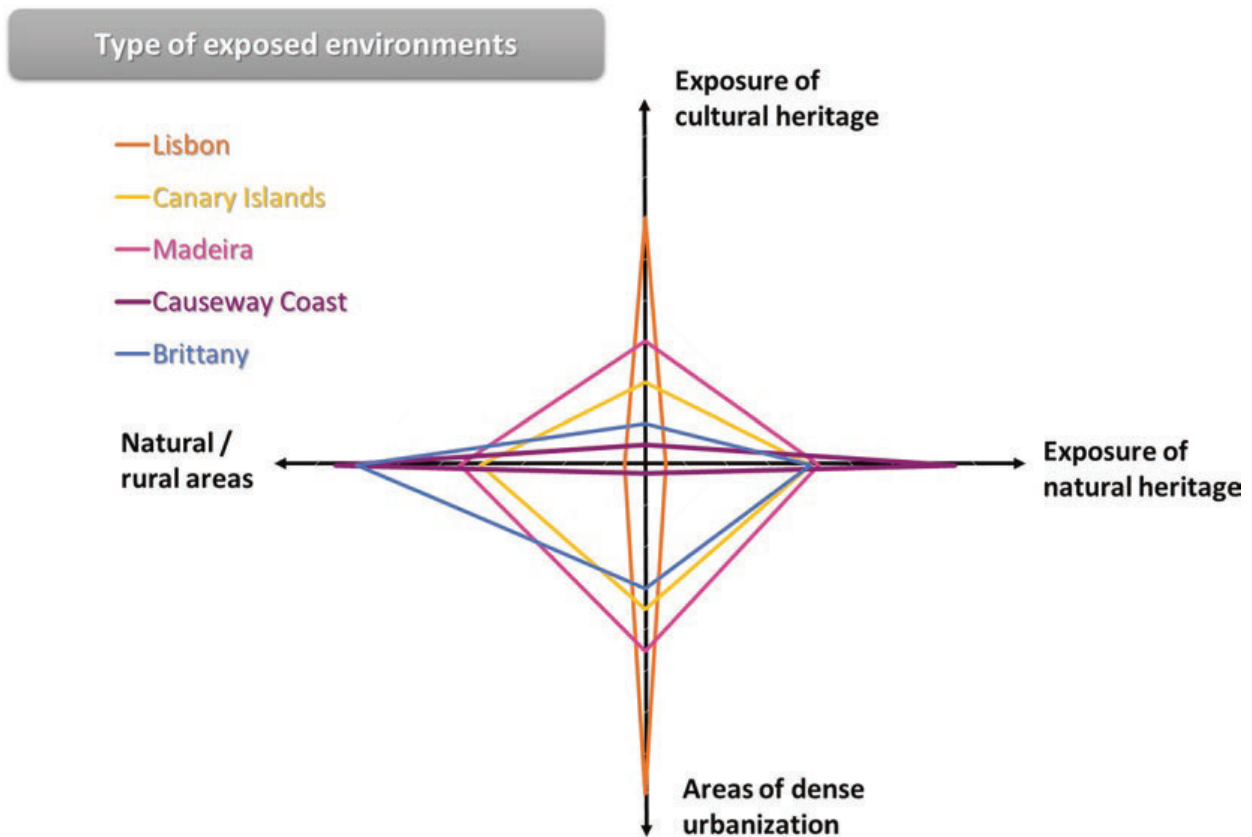


Fig. 8.7 Types of exposed environments in the AGEO pilots

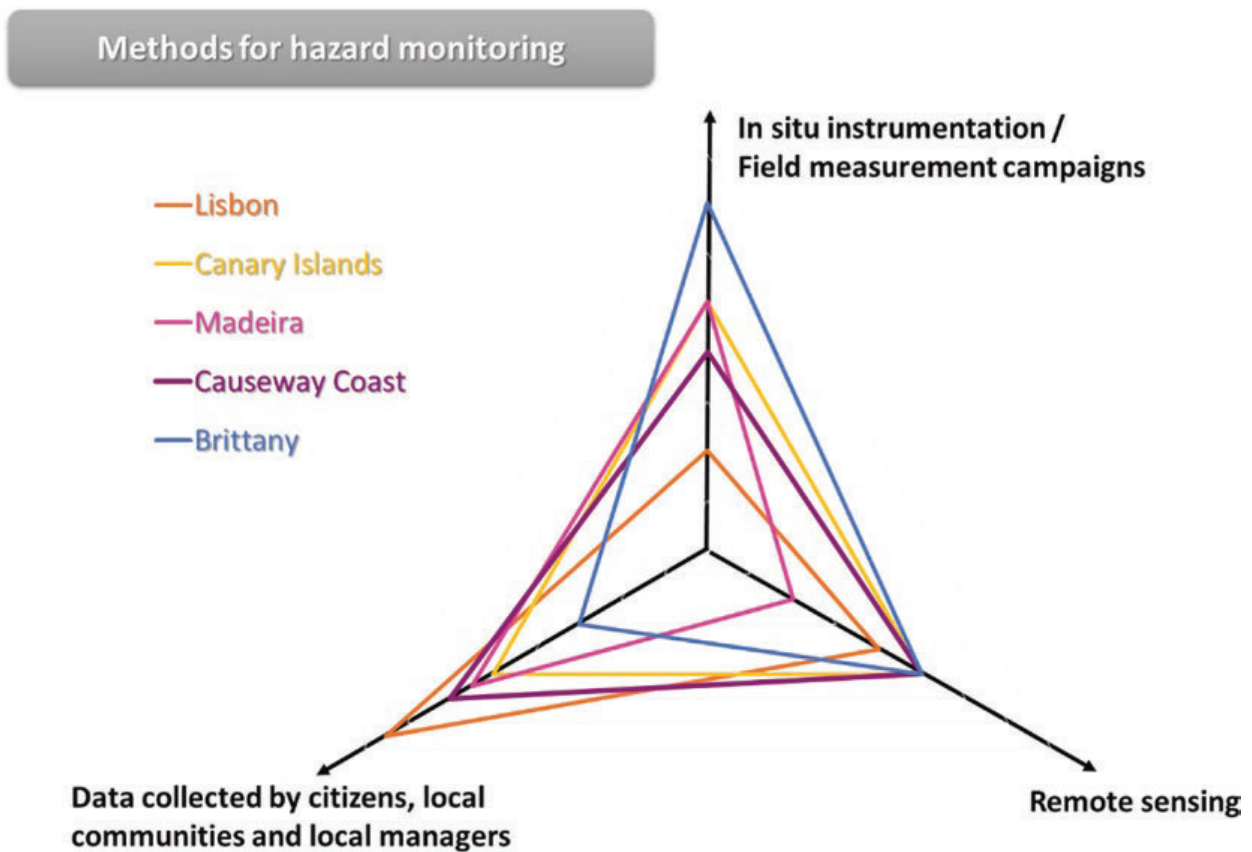


Fig. 8.8 Methods for hazard monitoring used by the AGEO pilots

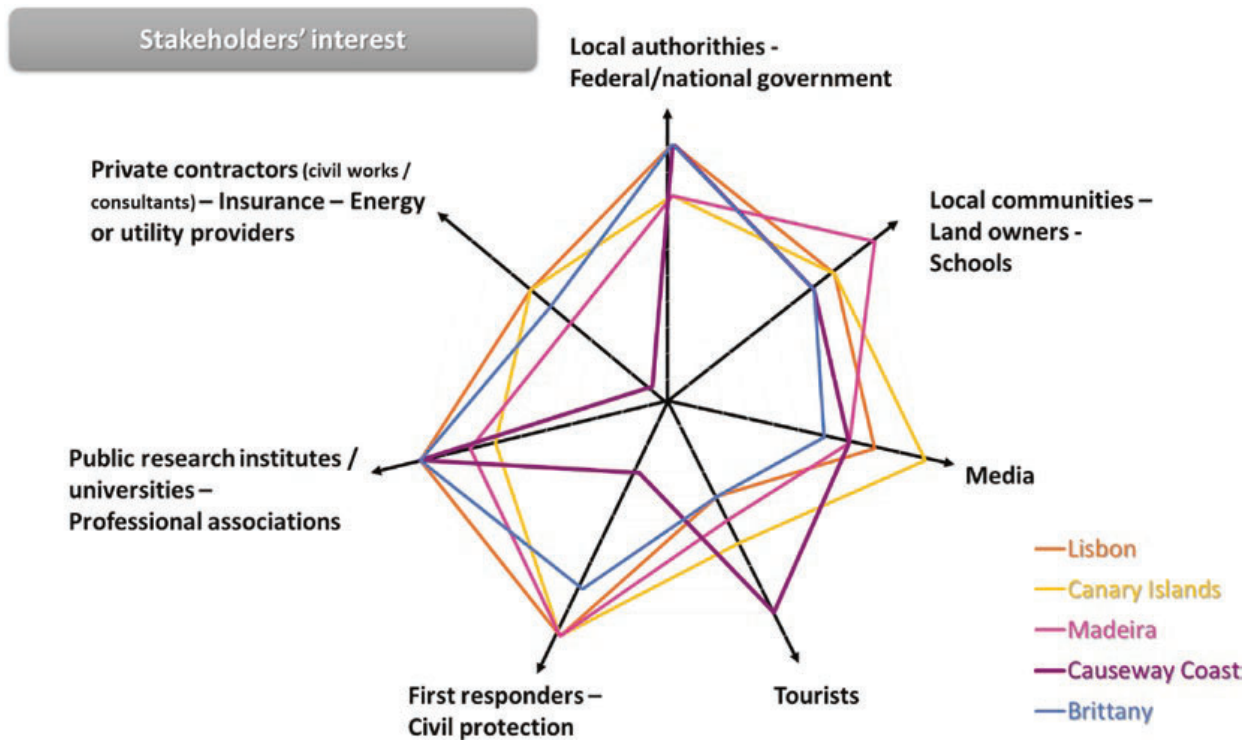


Fig. 8.9 Stakeholders' interest on the outcome of AGEO pilots

These classification matrices and the resulting QR codes confirm a variety of goals and overall strategic positions but also highlight similarities between the AGEO pilot observatories. Brittany and Lisbon pilots have similar QR-codes pilots, and so do Madeira and the Causeway Coast. It can be seen that all the observatories carry out activities related to scientific data collection and information/awareness-raising for citizens. The profiles reveal different types of missions ranging from scientific observation to operational decision support - sometimes in a crisis management context. As can be expected, observatories where

populations are highly exposed to natural risks consider the relationship with emergency services among their priorities.

8.4 Conclusion

The set of AGEO pilot observatories covers a wide range of configurations in terms of the profile, goals and constraints of the pilots. In this context, AGEO's achievement is precisely to have developed common tools suiting the needs of such a diversity of pilots. These tools mainly aim at reinforcing the commitment of

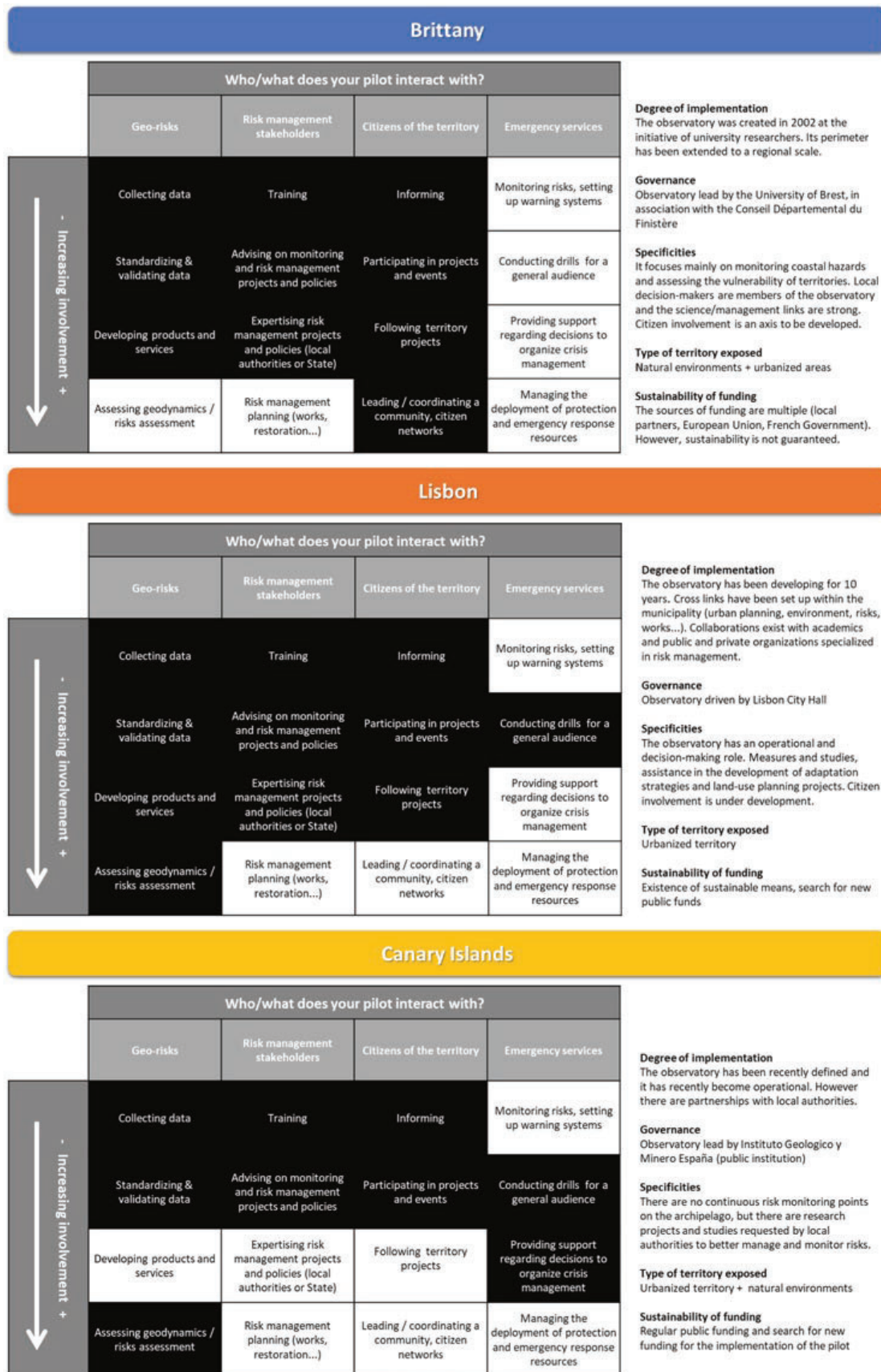


Fig. 8.10 Comparison of the “QR code” matrices for classification of the pilot observatories

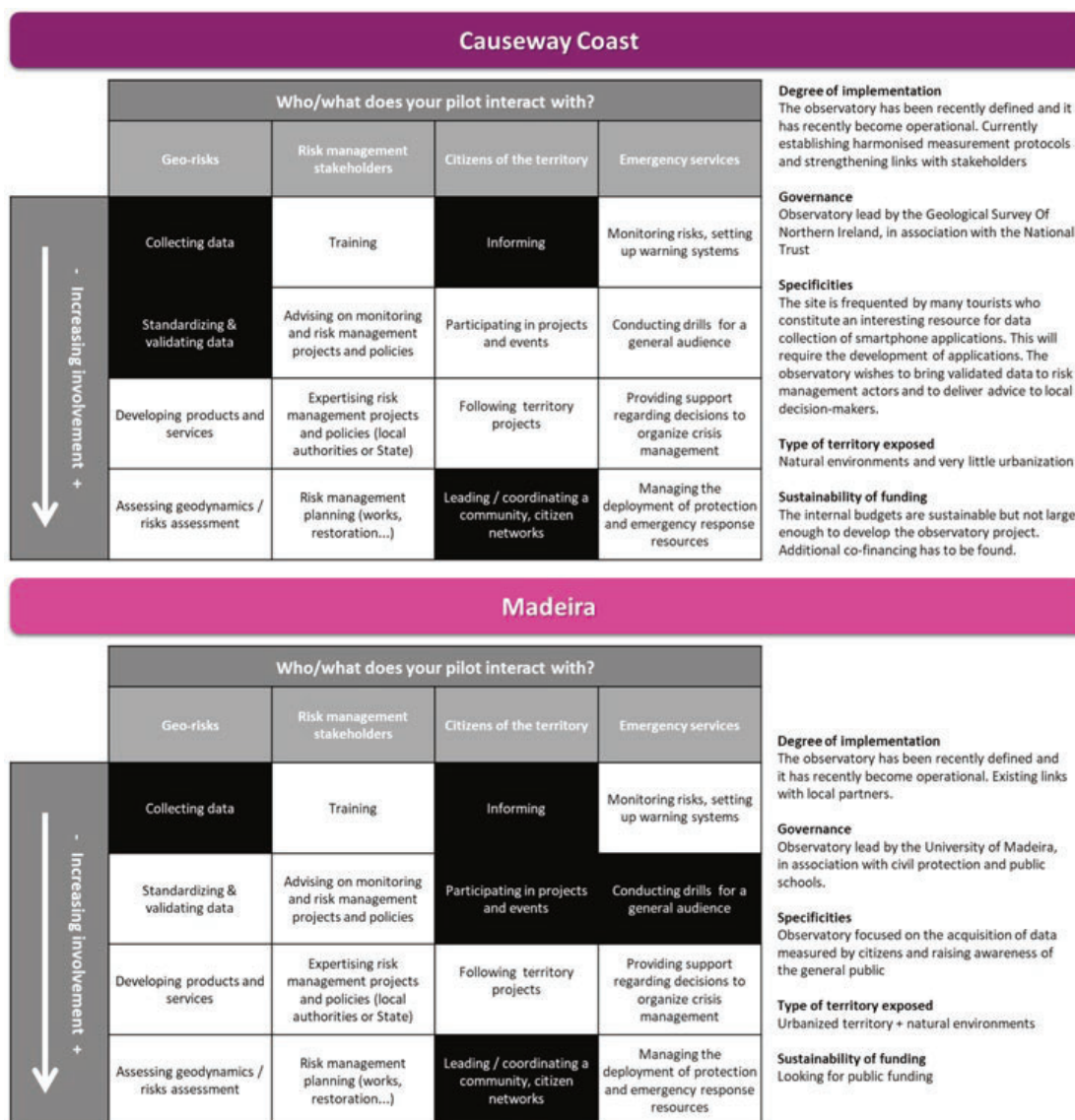


Fig. 8.10 (continued)

citizens so that they actively participate in the creation and dissemination of new knowledge on geohazards. Thanks to citizen involvement, AGEO pilots will be able to collect and exploit geohazards observation data to guide public action on the one hand, and to train exposed populations to increase their awareness and preparedness on the other hand. Given their applicability to the diversity of pilots AGEO, these tools are likely to be robust for potential transfer to new citizen geohazards observatories.

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Reference

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