

The Citizens Observatories as a tool to manage geohazards. Lisbon Multihazards CO case study

Les Observatoires Citoyens comme outil de gestion des géorisques. Étude de cas de le Observatoire Multirisques de Lisbonne

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ABSTRACT: As part of the Lisbon Multihazards Citizens Observatory, which is integrated in the AGEO Project - Platform for Atlantic Geohazard Risk Management, Lisbon Municipality has developed a platform to receive information by citizens - Citizen Observatory. The platform's interface, aiming to simplify the report, is based on graphic content and uses simple language, enabling ordinary citizens to give information about situations related with geotechnical risk in Lisbon. This solution allows citizens to play an active role in risk management systems and facilitates the monitoring of situations in which Lisbon Municipality technicians have increased difficulties due to lack of access. Ultimately, it allows Lisbon Municipality to anticipate problems that may arise in some parts of the city, such as settlements in buildings, enabling a proactive response and not a reactive one, as it happens today. In addition to the platform, educational contents were also developed aiming to raise population's awareness to geological risks, allowing the implementation of preventive measures.

RÉSUMÉ: Dans le cadre de l'Observatoire Citoyen Multirisques de Lisbonne, intégré à la Plateforme AGEO pour la Gestion du Risque Géohazard Atlantique, la municipalité de Lisbonne a développé une plateforme pour recevoir des informations des citoyens - l'Observatoire Citoyen. L'interface de la plateforme, visait à simplifier le rapport, est basé sur un contenu graphique et utilise un langage simple, permettant aux citoyens de donner des informations sur des situations liées au risque géotechnique à Lisbonne. Cette solution permettra aux citoyens de jouer un rôle actif dans les systèmes de gestion des risques et facilitera le suivi des situations où les techniciens de la Municipalité de Lisbonne rencontrent des difficultés accrues en raison du manque d'accès. En fin de compte, cet outil permettra à la Municipalité d'anticiper les problèmes qui pourraient survenir dans certaines parties de la ville, comme les affaissements dans immeubles, permettant une réponse proactive et non réactive, comme c'est le cas aujourd'hui. En plus de la plateforme, des contenus pédagogiques ont également été développés visant à sensibiliser la population aux risques géologiques permettant la mise en œuvre de mesures préventives.

Keywords: Citizens observatory; geotechnical risk; educational contents; AGEO app.

1 INTRODUCTION

The Atlantic region is exposed to a range of low-probability/high-impact events and various hazard risk scenarios, which, due to the low likelihood of occurrence and/or the high cost of mitigating actions, lack the level of preparation for effective monitoring and response. It is in this context that the AGEO Project emerges. The aim was to implement several citizen observatories pilots aiming to test a new form of engagement between civil society and local authorities for geohazards-related local capacity building, also encouraging the local use of innovative Earth observation products and services provided by European data infrastructures.

Lisbon is located at the confluence of the Tagus River with the Atlantic Ocean, which gives the city a prominent geostrategic position, but also a high exposure to natural and climatic hazards, such as earthquakes, tsunamis, coastal and urban floods, landslides, and an increasing occurrence of extreme weather events. The city presents a high population density and hosts most of the government and services buildings, which, in case of a disruptive event, could directly impact the decision chain. Many of these city buildings, as well as the infrastructures, are aged, so urban improvement is required to reduce the impact of natural phenomena.

Lisbon is already preparing for other threats by integrating responsive services which increase

efficiency, but developments are required to have a more effective planning for larger, more severe events brought on by geohazards and climate changes. Considering this, it is fundamental to prepare the society to better respond to disasters and to guarantee that citizens, properly oriented towards a problem, can provide valuable data about a specific event in their area of residence and play an active role in risk management systems.

This was the proof of concept demonstrated in the Lisbon Pilot, managed by the Lisbon Municipality, on the behalf of AGEO Project, which addresses seismic risk, urban floods, landslides, and geotechnical risk, and has the particularity of being developed in an urban context.

One of the key objectives of a Citizen Observatory is to assure citizen engagement, building awareness and involving specific groups of stakeholders, from the common citizen to specialized professionals. To achieve that, it is critical to provide the appropriate means for active citizens to participate. One of the easiest ways is to create a direct information channel for citizens, allowing them to easily communicate events related with natural risks or geohazards, when they witness one. In the Lisbon pilot, this communication channel was materialized in a mobile application, considering the different levels of expertise and accessible to everyone by smartphone.

The stakeholder groups were selected considering their respective area of activity and ability to promote efficient monitoring of risk situations. In this case, local civil protection groups, municipal services (firefighters, sewage and pavement brigades), the scientific community, schools, senior university students and scout groups were involved.

Using the app, the citizens can report geohazards events easily and, in this way, play an active role in risk management systems, allowing for a more informed decision, and ultimately contribute to the implementation of proactive measures rather than reactive responses in terms of risk management.

2 COMMUNICATION STRATEGY / PUBLIC AWARENESS

Given that geological hazards constitute a type of risk whose concept not all people understand and are not aware of the relevance that such risks may have on their daily routine, it was considered necessary to develop an easy and direct communication strategy, which in this case began with the creation of the project's mascot, RISKKA (Figure 1), a geologist who travels around the city of Lisbon, and became the communication identity of the Lisbon Pilot.



Figure 1. RISKKA, the Lisbon pilot mascot.

Using RISKKA, several communication materials were developed to support the work with stakeholders, particularly with educational community, such as flyers, posters, tray napkins with crosswords about AGEO and other games, bookmarks, rulers and keychains (Figure 2). These materials were distributed through several dissemination actions carried out in Lisbon schools, in which around 2500 students participated.



Figure 2. Educational Contents.

Aiming the engagement of the common citizen, a partnership with Delta Cafés (portuguese coffee company) was promoted, resulting in a campaign carried out to disseminate the AGEO Project through sugar packets distributed in the city of Lisbon (Figure 3). For this purpose, 10 layouts were developed regarding the risks managed by the Lisbon Pilot.



Figure 3. Two examples of sugar packets.

In addition to these materials, other contents were developed, including educational videos, in which RISKKA explains, teaches and alerts to some of the daily problems that occur in the city, explaining how to prevent them and how to react in different situations. The videos are available on Youtube and at the Lisbon Municipality web page (<https://informacoeseeservicos.lisboa.pt/prevencao/resiliencia-urbana/projetos/ageo>).

Given the diversity of the target audience, it was decided that communication on social media should be informal, explanatory, educational and with low

technical complexity, for easy understanding by the general population. Social networks, such as Facebook and Instagram, were widely used as communication platforms and more than 50 posts related to specific days were published during the Project (<https://www.facebook.com/ageoatlantic>; <https://www.instagram.com/ageoatlantic>).

3 LISBON AGEO APP

To assure citizen engagement and obtain as much data as possible, the Lisbon pilot developed a mobile application, accessible to everyone in every smartphone, available in iOS and Android formats, through which citizens can report situations related to geological risks, in particular earthquakes, landslides, floods, and geotechnical risk in the city of Lisbon, in a straightforward and standardized manner.

However, reporting geohazard events can be a tricky task. As the primary goal is to receive inputs from the biggest audience possible, the main target user is the regular citizen, that is, people with no technical expertise in the matters concerned. Still, it is expected that even a non-specialized citizen, if effectively directed, can provide meaningful and information about the witnessed events, allowing technical staff to analyse the reported data and to take better and informed decisions, even before visiting the site. This will optimize risk management systems and allow more informed decision-making, ultimately contributing to the implementation of proactive measures rather than reactive.

Taking these aspects into consideration, careful thought was put into the design of the geohazard reporting app, developing mock-ups of the app's user interface, and idealizing the user flow experience.

As the need for an easy, fast and low-cost implementation solution was evident, it was decided to use the technology available in Lisbon's spatial data infrastructure. Among the various applications available in the ESRI software, the ArcGis Survey 123 solution stood out, as it is free of access, it does not require any registration from the user and is accessible from the AppStore and Google Play. So, before using the AGEO application, citizens must install ArcGis Survey 123 on their mobile device, available on the Lisbon Municipality page.

3.1 Designing the user interface and application workflow

To provide a visual overview of the expected user interface for the report app, a set of mock-ups were developed. The layouts were designed focusing on the expected user experience and intending to provide an

easy way to use and a visually attractive interface, with graphic buttons that facilitate the user's perception of the required information.

After installing the platform, the user has access to the interface. The main steps of the application workflow while reporting an event are:

A. Choosing the type of event to report.

In this step, the user is presented with a grid of graphic buttons representing the different types of events (Figure 4). An option of "Other events" was added, to facilitate the usage by those citizens who don't know which event to choose or are not comfortable in identifying the specific event type.

B. Taking photos of the event and providing some additional descriptive info.

C. Defining the location and date of the event and indicating the major elements at risk (people, animals and/or assets).

To define the location, the user can choose to use the device location info or, manually, pick the correct location in an interactive map available.

D. Reporting specific event information.

In this step, the user will be presented with distinct interfaces, according to the event type, helping the user provide meaningful information about the event.

Careful consideration was taken when defining the input interfaces for the user to provide information about the event, favouring self-explanatory graphic buttons that allow him to visually interpret what is expected and quickly report the information. When asking for measurement units, scales of measure with physical objects were provided so the citizen could easily visualize and identify the correct amount, even if he is not used to the standardized unit measuring systems. For instance, when asking the user to indicate the volume of land mass displaced in a landslide event, a graphic scale using vehicles was used, as shown in Figure 5. The flow of a report ends with Submission.



Figure 4. Graphic buttons representing the event types.



Figure 5. Examples of the interfaces for step D for two event types: subsidence and landslides.

In complement to reporting events, the citizen can check all the reported events through the app. Using a map-based interface, the user can download the information related with the events reported in each location. Filtering or ordering the reported events by type of event or occurrence date is also available.

3.2 Dealing with the reported data

Reports made by citizens via the AGEO App are always received by The ReSist team of Lisbon Municipality, which is focused on the urban resilience sector. Once the reports have been received, they are forwarded to the services responsible for dealing with each situation. In addition, if there are people at risk (a situation that can be flagged directly in the app), the report is automatically sent to the municipality's fire department occurrence management system, in order to ensure that the rescue services can act more quickly. All communication between the app and the services, including reporting to the regiment, is based on ESRI technology and it is always possible to locate the incident.

While considering individually each of the reported events, it can be hard to envision if the driving forces behind it are of geological nature or if they are related to some other site-specific circumstances. But when the reports are analysed altogether, evidence of more complex and systemic “problems” can emerge.

This ability to globally analyse the reports of several occurrences spatially related is one of these great advantages behind multihazards citizens' observatories (Figure 6). Despite that, if a concerned citizen reports a hazard of any kind, local governments and authorities must assure that no immediate security concerns are in place and must take measures to correct any reported damages.

To achieve this, it is fundamental to guarantee that the reported information reaches the local authorities responsible for the first response operations, in case of an emergency and/or the services responsible for the maintenance of public space. With this objective in mind, Lisbon municipality is implementing an automatic workflow that forwards the information reported by the citizens to the adequate entities according with the circumstances reported through the geohazards report app.

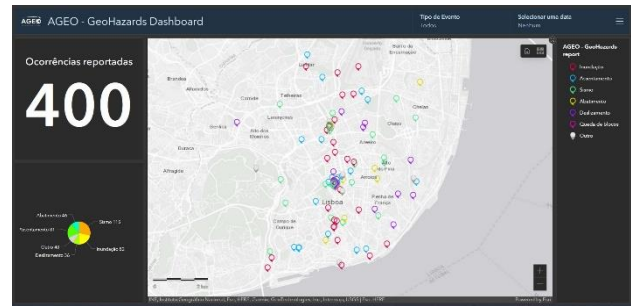


Figure 6. Dashboard for reports visualization and global analysis (data reflects simulated occurrences).

4 CONCLUSIONS

As part of the Lisbon Multihazards Citizen's Observatory, which is integrated in the AGEO Project – Platform for Atlantic Geohazard Risk Management, Lisbon Municipality developed a communication strategy based on a mascot called RISKKA. Educational contents were also developed aiming to raise the population's awareness to geological risks and allowing the implementation of preventive measures.

To receive information by citizens a platform was developed. The platform's interface aimed to simplify the report using simple language and based on graphic content, to enable ordinary citizens to give information about situations related with geohazards in Lisbon. The simplicity of the app and the visual presentation of the screens had an excellent receptivity by the test public. This solution will allow citizens to play an active role in the risk management system and will facilitate the monitoring of situations in which Lisbon Municipality technicians have increased difficulties due to lack of access. Ultimately, this tool will allow Lisbon Municipality to anticipate problems that may arise, such as settlements in buildings, enabling a proactive response and not a reactive one, as it happens today.

The implemented proof of concept allowed to demonstrate that a citizen properly aware of a certain problem can contribute to a more efficient risk management in the city of Lisbon.

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