

THE KNOWRISK PROJECT: WHEN COMMUNICATION BECOMES PREVENTION

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Prevention can positively intrude culture only if access to experts' knowledge is facilitated. On the other hand progress in seismic performance and even legal regulatory provisions can be more effective if the stakeholders are aware of the associated risks and benefits. Standing from these ideas, KnowRISK (Know your city, Reduce seISMic risk through non-structural elements) supports disaster reduction relying on risk communication.

KnowRISK is a project financed by the European Commission, under the General Directorate of Civil Protection and Humanitarian Operation, that addresses mitigation of non-structural component (NSC) damage caused by earthquakes in selected pilot areas belonging to the three participating countries, namely Portugal, Italy, and Iceland.

Often neglected by experts, significance of damage to NSCs is largely unknown to the public, specifically concerning costs and benefits associated to actions that can reduce their vulnerability. "If the house doesn't collapse, I will be safe" is a major fallacies among common citizens. Factors acting as barriers to the adoption of NSCs seismic protection need to be carefully addressed to understand why even solutions that might require low efforts, and costs, do not receive due attention. KnowRISK considered the direct engagement of public into the process of communication to be a good way to tackle this issue.

KnowRISK tasks are grouped into: 1) a Research for Action block that produces the input of knowledge to be delivered to communities in the participating countries and activate an 2) Action for Prevention block.

Target public in KnowRISK includes school communities (ISED 1 and 2 students, teachers and families), common citizens, and professionals. Knowledge, Attitude (Perception) and Practice (KAP) parameters are used to profile them and formulate a communication protocol well adjusted to their specific needs. Here, "Knowledge" is the understanding of earthquake phenomenon and the associated risks; "Attitude" refers to feelings and preconceived ideas towards it; and "Practice" refers to the ways in which communities demonstrate their knowledge and attitudes through their actions (NSET, 2017). The KAP approach allows a quantitative assessment of efficacy of risk communication to trigger, and establish prevention of NSC damage. Assessment of efficacy, rarely taken into account within risk communication actions (Infanti *et al.*, 2013), is a fundamental novelty of the KnowRISK communication strategy and is aimed at providing a replicable tool for other European countries (Platt *et al.*, 2017).

Research for action. Prevention should be based on research. The definition of seismic scenarios critical for non-structural damage in each participant country, a systematic compilation of most common NSC vulnerability situations, and the investigation of the level of awareness in specific communities are the background knowledge upon which the strategy of communication is built.

KnowRISK has considered that the engagement of public might contribute to assess the level of awareness of a community and offer insights for the communication campaign.

Public engagement is a major part of modern science communication is built. Experts might use difficult or ineffective terminology and omit information their audience might need in implementing mindful decisions (Bruine de Bruin and Bostrom, 2012). Paying attention to the needs of recipients can help in understanding people's priorities upon risk mitigation options (Fischhoff *et al.*, 2011).

Focus groups, interviews and roundtables with the public, a wide range of stakeholders, in the three participating countries allowed to address the following issues: the memories from

recent earthquakes, perception of distinction between structural and non-structural damage, the expected expert's role, the level of responsibility felt by the public. These were all incorporated into the strategy of communication: the message, the language and tools had to take into account the output of the research conducted on the target public (Musacchio *et al.*, 2017).

Action for prevention. Prevention should be supported by communication.

For each target public, specific media and tools judged suitable for effective communication were used. Because communication in KnowRISK is based on public engagement each tool takes needs of the target public into accounts. "Differentiate, mix and repeat" was the main lesson learned during engagement with public: the more differentiated is the access to the same message (events, leaflets, social networks), the more effective the communication was found to be. The tools are designed to take into account cultural peculiarities of local communities, but they can be easily adapted for other European countries.

In schools, media that rely on students' direct engagement and a flipped-up learning approach were used. For communicating with citizens, videos and printed brochures were used. Both digital and printed media were used to communicate with the professionals. A cross-media tool, specifically implemented in the KnowRISK project, is based on Augmented Reality.

A protocol of communication in schools. Protocols of communication in schools were different in each country, as per local needs, and existing theoretical approaches in risk communication judged suitable for local needs by the project partners. Assessment of effectiveness through quantitative improvement of KAP provided feedback to better calibrate the protocols on a scientific basis.

"Know your school: be safe!" was the KnowRISK communication campaign in schools. It stood on a participatory process that starts with understanding and ends with building up or reinforcing knowledge, and acting on attitude to promote a shared view of a more resilient society. School education is fundamental in disseminating knowledge and in raising risk awareness. Schools include resources - that can be mobilized to reduce the risk of disaster (Luna, 2012). These resources are students, teachers, parents, community associations, the school infrastructure and the endogenous knowledge of the school system.

In Portugal, the focus was on knowledge building and development of competences. In Italy, we relied on a peer-to-peer communication (Piangiamore *et al.*, 2017), asking the students to prepare a product (e.g., videos, cartoons, etc.) to convince their peers of the need to undertake preventative actions against the potential harm that non-structural elements may have in case of an earthquake (<https://www.youtube.com/watch?v=DUv4gvDwsg0>). In Iceland, the focus was on renewal of local population's experience of the destruction from past earthquakes, and explaining how easy and low cost the mitigation measures can be.

A Practical Guide. The Practical Guide (O'Neill *et al.*, 2017) addresses essentially non-structural issues found in our homes. It privileges DIY (do it yourself) solutions at no cost (ex: move heavy or large items to the floor or low shelves) or low cost solutions such as hanging mirrors and pictures, installing latches on kitchen cabinets, etc. The main end-users are the householders that are guided into a process of increasing safety, efforts and eventually cost. Four steps are coded in the Guide (Fig. 1): Move, referring to actions that just require rearranging furniture; Protect, referring to valuable fragile or expensive object; Secure, referring to large and heavy items that pose serious danger when loose; Retrofit, referring to those actions that are more intrusive and need an expert intervention. The Guide provide indication to implement, where possible, DIY actions.

A Short Guide for Students is prepared in a suitable language for students that are intended to be the major actors in building a culture of prevention (Fig. 2). The Short Guide addresses two settings: one specific for school and another specific for home. It includes suggestions on how to make classrooms, school laboratories and teenagers living environments more secure.

They both make extensive use of visual content in order to reduce the text and capture the attention of the reader; both tools convey the concept that some actions are inexpensive and

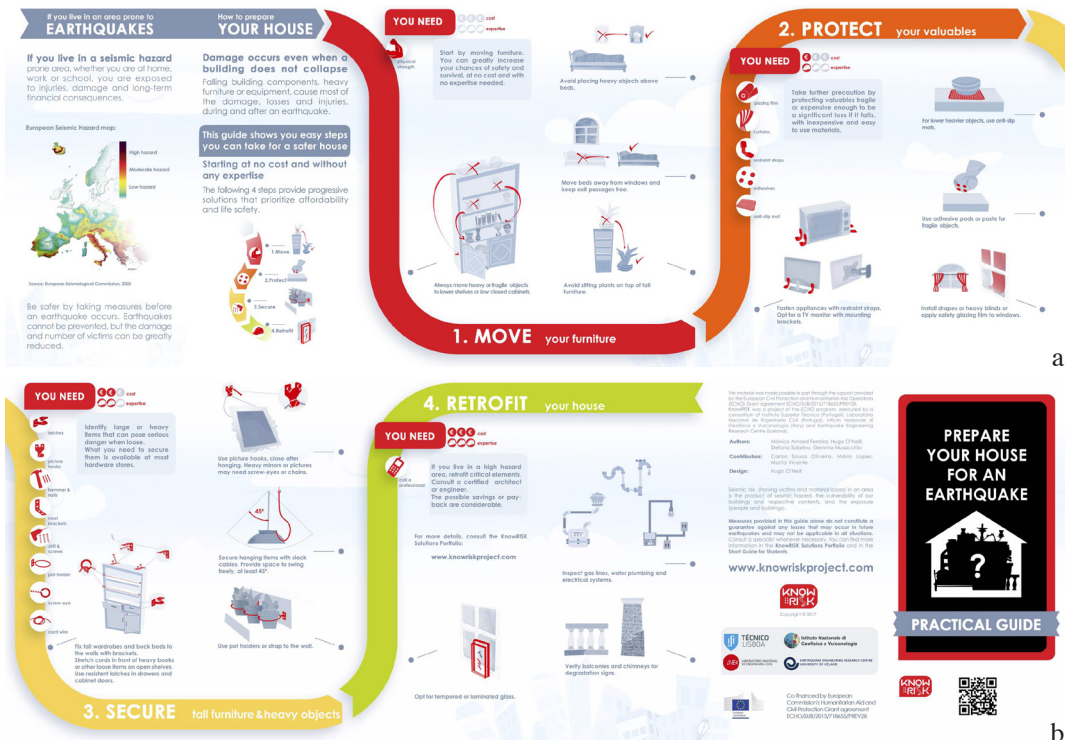


Fig. 1 - Practical Guide addressing the most NSC risk mitigation actions, that common citizen should implement. It is foldable leaflet (6 folds): inside part (a), outside page (b) of the leaflet.

easy to achieve. However, they also stress that for more demanding retrofitting, the help of a professional is recommended. Finally, they have both been designed to be handy, thus printed versions are made available to be directly distributed to the public.

Portfolio of Solutions for NSC risk mitigation. Professionals are responsible for implementation of retrofit measures to reduce non-structural vulnerability. We provide a Portfolio of Solutions for them. KnowRISK Portfolio of Solutions is a comprehensive publication, which identifies potential earthquake hazards associated with non-structural elements of residential buildings, workplaces or schools and further provides detailed instructions and guidelines for mitigating those hazards, considering the stakeholder groups perspective. Different stakeholder groups characteristically have different motivations and criteria (e.g., investment risk, operational risks, and market risks) for decisions relative to catastrophic hazard mitigation. The KnowRISK Portfolio chooses two groups of stakeholders: “Owners and Facility Managers” and “Homeowners”. The Owners and Facility Managers are responsible for enabling efficient and effective use of buildings (architects, engineers and contractors).

Conclusions. Prevention is built upon research, technological improvements, but has lots to do with communication. This can be achieved only if access to experts’ knowledge, that will also trigger awareness of associated risks and benefits, is facilitated. KnowRISK promoted prevention establishing a communication strategy that stood on a solid research background. A specific item, yet widely underestimated and neglected, concerning prevention was addressed, namely NSC vulnerability reduction.

The KnowRISK approach to risk communication of NSC vulnerability has some peculiarities with respect to similar initiatives. First, the audience is very wide, ranging from youth to adults, common citizens, and professionals, non-experts to experts, conversely to what often happens since in most cases the target is precisely identified and limited to certain age / skills /

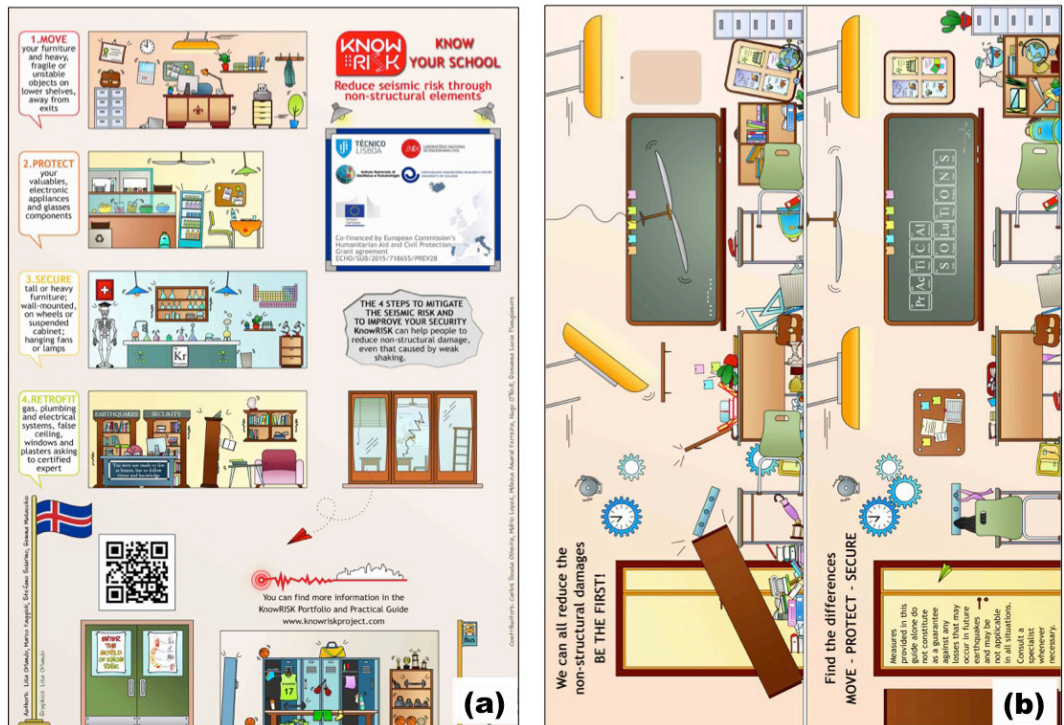


Fig. 2 - Short Guide for students: the school. Most common situations and rooms in a school (office of school principle, laboratories, the canteen, the dressing room) are shown and general suggestions are given. The classroom (2b) is addressed in more details showing actions without (2b, left) and with solutions for NSC vulnerability mitigation (2b, right).

environment. This reflects in the variety of deliverables and especially in their tuning to specific backgrounds and needs.

Second, the project not only aims at informing but it also pushes to undertake actions (“Know your school: be safe” and/or Practical Guide and/or Portfolio) to increase safety. Up to now, educative projects were often aiming at taking consciousness of potential damages but seldom were “suggesting” how to mend them with physical actions. This involves additional difficulties in testing the effectiveness of the project. In fact although KnowRISK foresees ex-ante, ex-post validation questionnaires, their results are only limited to the estimate the increased awareness in schools. It is very difficult to check if and how much of the message will be converted by the addressee or their families into safety actions, also because retrofitting takes longer time than “getting informed”.

However, being the first project ever, at least in the participating countries, to deal with the matter, we believe that most of the result will mainly depend on the spread of the deliverables and the cooperation of the stakeholders.

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References

Bruine de Bruin W. and Bostrom, A. (2012). Assessing what to address in science communication. Proceedings of the National Academy of Sciences of the United States of America; 110(3): 14062–14068.

Fischhoff, B. (1995). Risk perception and communication unplugged: twenty years of progress. Risk Anal.;15(2):137-45

Infanti, J., Sixsmith, J., Barry, M.M., Núñez-Córdoba, J., Oroviogicoechea-Ortega, C. and Guillén-Grima, F. (2013). A literature review on effective risk communication for the prevention and control of communicable diseases in Europe. Stockholm, ECDC

- NSET (2017). Risk Perception Survey in Bhimeshwor Municipality. National Society for Earthquake Technology-Nepal (NSET) 16WCEE Conference Chile 9 January 2017.
- Piangiamore, G.L., Eva, E. and Musacchio, G. (2017). **The participatory risk communication action of the KnowRISK project: Italy.** In: Proceedings of the International Conference on Earthquake Engineering and Structural Dynamics, 12-14 June 2017, Reykjavik, Iceland.
- Platt, S., Musacchio, G., Crescimbene, M., Pino, N. A., Silva, D. S., Ferreira, M.A., Oliveira, C. S. and Lopes M. (2017). **Development of a common (European) tool to assess earthquake risk communication.** In: Proceedings of the International Conference on Earthquake Engineering and Structural Dynamics, 12-14 June 2017, Reykjavik, Iceland.
- Musacchio, G., Falsaperla, S., Piangiamore, G. L., Solarino, S., Crescimbene, M., Pino, N. A. Eva, E., Manzoli, F., Butturi, M., Fabbri, M. and Accardo M. (2017). **KnowRISK on Seismic Risk Communication: the set-up of a participatory strategy.** In: Proceedings of the International Conference on Earthquake Engineering and Structural Dynamics, 12-14 June 2017, Reykjavik, Iceland.
- O'Neill, H., Ferreira, M.A., Oliveira, C.S., Lopes, M., Solarino, S., Musacchio, G., Candeias, P., Vicente M. and Silva D. S. (2017). **KnowRISK Practical Guide for mitigation of seismic risk due to non-structural components.** In: Proceedings of the International Conference on Earthquake Engineering and Structural Dynamics, 12-14 June 2017, Reykjavik, Iceland.

REGIONE CALABRIA: UN LABORATORIO DI ATTIVITÀ PER LA PREVENZIONE DEL RISCHIO SISMICO

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La Calabria è una delle regioni della penisola italiana interessata storicamente da terremoti di forte intensità e da sequenze sismiche di bassa magnitudo, anche di lunga durata, che evidenziano una sua costante evoluzione tettonica e un'elevata pericolosità sismica.

La Regione Calabria, ormai da anni, svolge attività diversificate che mirano ad una prevenzione efficace del rischio sismico. Nell'ambito del programma nazionale di prevenzione del rischio sismico (art. 11 Legge 77/2009), la Regione ha avviato ed intensificato processi e metodologie virtuose di riduzione del rischio, che spaziano da una maggiore conoscenza del territorio ad interventi di riduzione della vulnerabilità ed esposizione. Ne sono un esempio gli studi di Microzonazione Sismica (MS) e Condizione Limite per l'Emergenza (CLE), gli interventi strutturali di miglioramento, adeguamento, demolizione e ricostruzione degli edifici di interesse strategico, di quelli privati, degli edifici scolastici, nonché l'attività di sensibilizzazione e di formazione per una "non strutturale" mitigazione del rischio sismico.

Microzonazione sismica e CLE. La Calabria rappresenta una delle regioni italiane maggiormente interessata dal programma nazionale di prevenzione del rischio sismico, con la realizzazione di studi di MS e di CLE su tutto il territorio calabrese. In particolare, in base alle prescrizioni dettate nelle ordinanze (criteri di accesso ai contributi), 402 comuni calabresi su un totale di 409 hanno diritto di accesso ai finanziamenti, poiché caratterizzati da $ag > 0,125$ g.

Per una migliore gestione delle complesse procedure previste in ordinanza, la Regione ha stipulato un Accordo di collaborazione con il CNR-IGAG, Istituto di Geologia Ambientale e Geoingegneria, con lo scopo di ricevere un supporto tecnico-scientifico qualificato nell'ambito di tre principali linee di attività, descritte sinteticamente di seguito.

Valutazione e validazione degli studi MS e CLE. Si tratta di una attività di istruttoria per la validazione degli studi di MS e analisi della CLE trasmessi alla Regione ai sensi delle ordinanze OPCM 3907/2010, OPCM 4007/2012, OCDPC 52/2013, OCDPC 171/2014 e