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KnowRISK

Know your city, Reduce seISmic risK through non-structural elements

Prevention and preparedness projects in civil protection and marine pollution. Prevention Priorities

Deliverable Report

Deliverable E3 – Know your school: cope with non-structural vulnerability

Task E – Tools and strategies of risk communication and learning

Deliverable/Task Leader: INGV/INGV

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Dissemination Level		
PU	Public	x
PP	Restricted to other programme participants (including the Commission Services)	
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Preface

Deliverable Author: Gemma Musacchio, INGV

Deliverable Contributors

Commented [GM1]: THIS IS A SUGGESTION

INGV: Giovanna L. Piangiamore, E. Eva and S. Falsaperla

LNEC: Delta Silva e Sousa

IST: Mónica Amaral Ferreira, Carlos Souse Oliveira, Mário Lopes

EERC: Rajesh Rupakhety

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1. DESCRIPTION OF THE DELIVERABLE

1.1 INTRODUCTION

This deliverable describes the action **"Know your school: be safe!"** that was undertaken in schools of the four KnowRISK project pilot areas (Figure 1) located within the three participating countries. These are Lisbon, for Portugal, Northern Italy and Mt Etna area, for Italy, and South Iceland, for Iceland.

Figure 1: The four pilot-areas: Lisbon, South Iceland, Northern Italy and Mt Etna area. The map is the 2013 European Seismic Hazard Model (ESHM13). Snapshots from the videos "Before it's too late" (a), "In compliance with nature" (b) and "Mt Etna" (c) - https://www.youtube.com/channel/UCg0VxYGPYa2bUGXIhZl35zQ. Photos of non-structural damage at Mt. Etna pilot area are from Azzaro et al. (2016)

Because the project strongly relies on setting communication strategies based on local communities needs, actions and protocols described here are different in each country and pilot areas. Differences are also based on existing theoretical approaches in risk communication that project members consider being more targeted to local situation. The background expertise by each project member involved in the actions was also a reason of different communication strategies. In Portugal project members are engineers

and social scientists; in Italy they are seismologists, geologists, psychologists and some of them have degrees in science communication; in Iceland they are engineers. All of them challenged their skills and expertise within a Public Engagement in Science (PES) approach that in early 2000's started to gradually replace the so called Public Understanding of Science (Thomas and Durant, 1987) that proved to be insufficient to make the expected changes in the society (Stilgoe et al, 2014).
The results are **three different protocols** of intervention **well adapted to local needs**, having **replicate capability**, and a learning experience standing on the principles of PES with mutual exchanges among project members and students that participated in the action. Protocols include assessment of impact and effectiveness based on quantitative and semi-quantitative approaches that are described in Deliverable D3. We based our communication strategy on experimental trial-and-error approach. The final protocols will be ready after the assessment what did not work and what was most effective. At that point we will be able to make changes to the protocols described at this stage (this document) and deliver procedures ready to be used by other European countries.

This document is structured with a description of the three case studies and for each local situation, principles of intervention, methods and actions are thoroughly described. Intervention in schools took place in Lisbon between October 2016 and March 2017, in Italy begun in March 2016 and will end May 2017, in Iceland between March and April 2017.
This document includes analysis and discussion from the following 3 papers submitted ICESD - International Conference on Earthquake Engineering and Structural Dynamics-conference that will be held in Reykjavik, June 12-14 2017, and will host a KnowRISK project special session:

1. **KnowRISK on Seismic Risk Communication: the set-up of a participatory strategy**- by G. Musacchio, S Falsaperla, G. L. Piangiamore, S. Solarino, M. Crescimbene, N. A. Pino, E. Eva, F. Manzoli, M. Butturi, M. Fabbri, M. Accardo and The KnowRISK Team

2. **Risk communication - KnowRISK Intervention- The Portuguese case**- by D. Sousa e Silva, M. Vicente, A. Pereira, R. Bernardo, M.A. Ferreira, M. Lopes, C.S. Oliveira and P. Henriques

3. **The participatory risk communication action of the KnowRISK project: Italy**- by Piangiamore, G.L., Eva, E., Musacchio, G.

1.1.1. Schools and Public engagement in science

A major target of KnowRISK (Know your city, Reduce seISmic risK through non-structural elements) is facilitating local communities access to expert knowledge on non-structural seismic risk protection solutions. The approach to communication undertaken by KnowRISK rests on a dialogic framework that is the base for PES, where experts and

members of the public are involved in a process of mutual learning that foresee not just the improvement of knowledge but also the **change of perspectives and views**.
PES stands on the recognition of the importance of multiple perspectives and domain of knowledge that profit not just from expertise but also from experience. Such dialogic approach in risk communication may result into an increase of mutual awareness: experts collect inputs to tune their actions and improve their communication skills, while the public participation ensures the establishing of shared rules and reinforce active citizenship. It does also act on the building of thrust among all the actors involved.

The KnowRISK communication wants to promote change in Knowledge-Attitude-Practice (KAP) in communities. This is pursued understanding of what the target audience already **Knows** (NSET, 2017; Platt et al., 2017) on earthquake and the associated risk, what is the **Attitude**, in terms of feelings and preconceived ideas towards it and what is the **Practice** that communities undertake. A successful communication will improve KAP.

The Target public is chosen to be (1) schools in the first place, then (2) citizens, mostly as a by-product of communication in schools, and (3) building stakeholders. This deliverable describes **"Know your school: be safe!",** the communication action in schools, while Deliverable E2 is for citizens and building stakeholders. **The action** is intended to raise awareness, among the school community, of the seismic risk problem and to eventually change people's **attitudes** and **practice** by stimulating the adoption of protective behaviours.
By emphasising the vital role of school education in disseminating knowledge and in raising risk awareness, Luna (2012:750) refers to schools' resources and to the fact that these can be mobilised to reduce the risk of disaster. These resources include students, teachers, parents, community associations, the school infrastructure and the endogenous knowledge of the school system.
The KnowRISK campaign addresses lower- and upper secondary schools that, according to the International Standard Classification of Education ISCED 2011 correspond to ISCED level 2 and 3. The success of interventions and level of students' engagement often rests on school board participation.

1.2 THE PORTUGUESE CASE

The Portuguese case study differs from Italian and Icelandic cases in terms of the infrequency of earthquakes and the low-level disaster experience. For the inhabitants of Lisbon, seismic risk is something distant and something they do not think about in their daily lives. Given this, the school children of the target-group for risk communication (ISCED level 2 and 3), are likely to be less aware of seismic risk, including the risk of non-structural damage and injury, than children in Italy and Iceland.
Becker et al. (2012) stress that education on earthquake safety preparedness very often fails due to the lack of knowledge about the way the different individuals apprehend risk-related information and about the way they act preventively.

Presently, several models co-exist in social sciences, which are aimed to explain the decision-making processes as regards seismic protection of both individuals and families (Lindell et. al, 2009; Lindell et. al. 2012; Becker et. al, 2012; Becker et. al., 2013). The Portuguese research team identifies the following set of general principles on which these models are thought to stand:

- The decision-making process is stimulated by **environmental** or **societal** guidelines in the form of disaster experience or risk information, which encourage individuals to ponder the subject;
- Even though risk perception is an important forerunner of protective action, there are other factors that are just as, if not more, important, amongst which we can highlight the **individuals' beliefs** in each of the protective measures;
- The specific **context** in which the individuals are integrated plays a part in the individual decision-making process, and it may either be an enabler or a constraint.

1.2.1. Principle of intervention

"Know your school: be safe!" for the Portuguese case is based on the Becker et. al (2012a; 2012b; 2013) model. These authors define the adoption of protective behaviours as a four stages process: i) risk **Knowledge** and awareness; ii) reflexion and dialogue; iii) vision of the consequences; iv) development of competences (action in terms of **Practice**) (Figure 2).

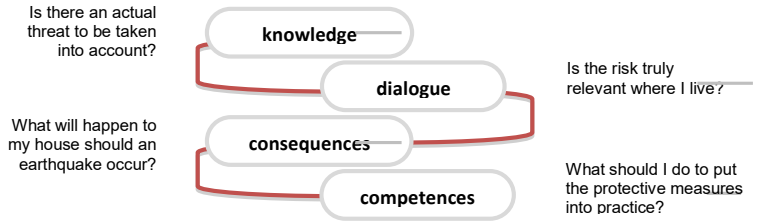

Figure 2. Diagram for the model of protective behaviours adoption (Beker et. al, op. cit).

Knowledge- The stage of risk knowledge and awareness is triggered either by the exposure of individuals to information about risk or by the direct or indirect disaster experience. One or the other provides clues that act as a warning leading the individuals to ask themselves the following question "is there an actual threat that must be taken into account?".

Dialogue- However, risks knowledge and awareness will not necessarily lead to the immediate adoption of a protective action. The most likely hypothesis is that they will first lead to reflexion and dialogue, as an attempt to confirm the threat and to understand

it better. This is the stage in which the individuals feel compelled to search for more information about the subject; to bring the topic up in conversations with friends and relatives; and to contact field-related organisations or experts. The main purpose is the clarification of doubts, such as: "*is the risk truly relevant where I live*?

Consequences- The main purpose of this stage is the vision of what might happen: *What would happen* to my town if an earthquake occurred? . Becker et al (in ibid) refer to the important role played by organisations and experts in this stage, as it regards the clarification of doubts and the encouragement to adopt protective actions. The interaction with others, especially with credible experts or organisations, can be important to help individuals building a vision of the consequences of earthquakes and to weigh in the advantages/disadvantages of the adoption of protective behaviours. Individuals need to have a clear perception and **Attitude** of the expectable impact of an earthquake in their homes, neighbourhood and town as to be able to make decisions in terms of protection. "How damaged will my house be after an earthquake? What might collapse? For how many days should I store water and food?". In other words, they need to "personalise the threat" and also to believe that there are various protection alternatives that are worth exploring and implementing.

Competences- Once the individuals are convinced (i.e. their **Attitude** has changed) that the risk is real and that some protection alternatives can be adopted (i.e. **Practice** can be changed) , they become more motivated to develop their skills in terms of protection. Generally, it is in this stage that the individuals formulate questions such as: "which are the best protective actions? *What should I do to put them into practice*?". Reference must be made to the fact that once this stage is reached, the individuals may only develop behaviour intents rather than put actions into practice. The postponing of protective actions, in favour of pressing daily demands, is fairly common, particularly in the cases when no eminent threat exists.
Overall **"Know your school: be safe!"** is taken as an opportunity to disseminate information on risk and seismic protection, and it is expected to eventually lead to risk awareness; to the search for further information; to debates about the subject; to a perception of the consequences and, lastly, to the development of competences from a protection viewpoint.

1.2.2. "Know your school: be safe" in action: the Portuguese case

1.2.2.1 *At school and for schools*

The target-schools have been recently subjected to seismic strengthening works. Therefore, this must be maximised as an opportunity to raise awareness among the school community, from students to teachers, about the importance of structural safety of buildings. The protocol of intervention is a flow (Table 1) including a total of six actions, mostly run at school with the exception of the visit to LNEC's laboratories. All of them required the presence of KnowRISK team members, which were civil engineers, sociologists, architect and geophysicists.

Type of Action	Action	Description	Support material	Duration	Observations	Expertises
Knowledge	Survey T0			30 min		Sociologist
	Lecture I (Is Lisbon subject to seismic risk?)	Dissemination of knowledge on seismic risk and earthquake impacts	Movie, RiskMAP and power point	45 min		Civil engineering
	Lecture II (What can we do to protect ourselves?)	Dissemination of the available seismic protection alternatives	Movie (shake table tests), non-structutal protectives samples, power point	45 min	At the end each student will be given a checklist in order to do a Hazard Hunt at home with their family.	Civil engineering
Dialogue	Debate (scientists reply to questions raised by students)	Session intended for stimulating the dialogue between scientists and students		3h	This debate could benefit from the fact of taking place outside the school, during a study visit to LNEC	Civil engineering, Geophysic
Vision of consequences	Session (How can an earthquake affect my home or my neighbourhood?	Scientists promote a session in which they help students building a vision of the consequences of an earthquake	Movie "A história do Bruno"	45 min	The students present and talk about the vulnerability cases found in their homes as the result of the Hazard Hunt activity.	Civil engineering, Architect, Sociologist
Development of competences	Building a Maquette (House rooms: Vulnerability and resilience areas)	Each group (2-3 persons) creates the interior of a room (bedroom, kitchen, living room and office), indicating on this model the vulnerabilities and the non-structural protective solutions that can be adopted	Bases of the model and materials for building the interiors	3h	At the end each group's room are assembled to form a whole house	Architect, Civil engineering, Sociologist
	Survey T1					Sociologist
	Inauguration of the exhibition KnowRISK	Exhibition of the works done by the students within the framework of the intervention			The students will have the opportunity to present theirs works to the entire school	School organization

Table 1. "Know your school: be safe" schools intervention flow in Portugal

The two selected schools, School Rainha Dona Leonor and School Padre António Vieira involved an overall of 108 students. The intervention comprises a set of actions devised in the light of the previously mentioned Becker et al (op. cit) four stages model. Accordingly, the actions proposed are aimed to:

1) Promote dissemination of *knowledge* and to raise awareness of the risk;
2) Stimulate the *reflexion* and *dialogue* about the problem;
3) Stimulate students to build a *vision of the consequences* of an earthquake on the place where they live;
4) Promote the development of *competences* regarding non-structural protective measures.

To support the actions foreseen under the intervention, a notebook was designed to guide students through. The KnowRISK notebook main objectives are to consolidate the information given and also to help the evaluation of the intervention, which is a matter presented in deliverable E5. There are several spaces where students are invited to give their opinion on certain topics or actions (Figure 3).

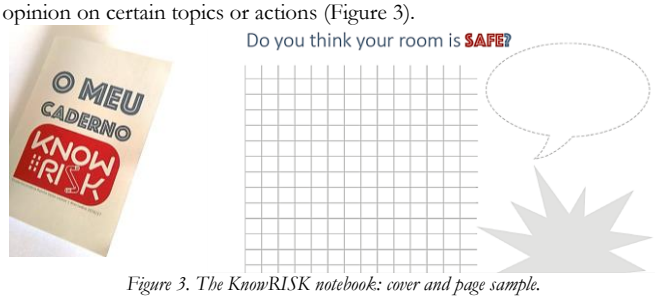

Figure 3. The KnowRISK notebook: cover and page sample.

Lectures I and II- We assumed that students would have little knowledge about seismic risk, its level of incidence in Lisbon, and about the protection alternatives available for societies and individuals. Therefore, the initial stage of the intervention included two knowledge dissemination actions, with approximate duration of 45 minutes, intended to stimulate risk awareness:

- Is there seismic risk in Lisbon? | First lecture, introducing seismic risk concepts and Lisbon's vulnerability to this type of extreme events;
- What can we do to protect ourselves? | Second lecture, presenting the various protection alternatives available, with particular emphasis on non-structural measures that can be implemented by citizens (Figure 4).

This session finished with the presentation of the "**Home Hazard Haunt**", a challenge for students and parents to find the non-structural vulnerabilities of their homes.

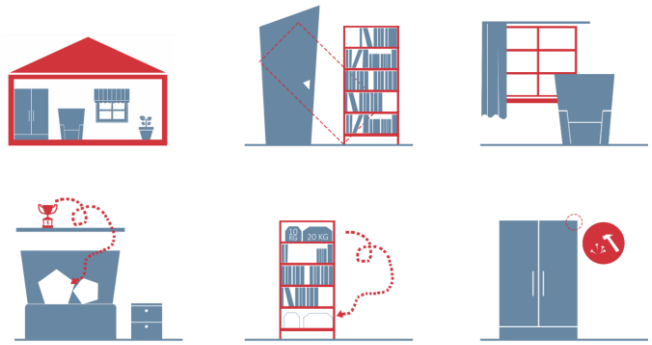

Figure 4. KnowRISK pictograms representing vulnerable situations often found inside buildings.

Dialogue- The knowledge dissemination stage was followed by an action aimed to initiate a dialogue between scientists and students. As previously stated, once exposed to information about risk, individuals are normally led to explore the subject and to dialogue with others to confirm the threat previously presented.

This reflexion and dialogue stage was promoted by a field trip to LNEC campus, during approximately 3 hours (Figure 5). In this visit students were able to:

- Visit the shaking platform at LNEC Seismic Engineering facilities, where they were able to discuss and learn more about the behaviour of structural and non-structural elements during earthquakes;
- Interact with Civil Protection specialists, during a presentation on emergency and preparedness and a visit to emergency communications vehicles;
- Participate in the contest "**Who wants to be safe?**", inspired on the television show Who wants to be a millionaire?, specially design to help students consolidate what they already knew and to talk to several specialists about their doubts regarding non-structural protective measures.

Figure 5. Three key- moments of the field trip to LNEC.

Consequences- According to the Becker model, after getting the chance to confirm the threat, it is important that individuals visualize the possible consequences caused by earthquakes. In this context, under the visualization of consequences stage, during a 45-minute class, the following actions took place:

- Bruno's Story | Short video inspired by an interview from one individual who survived the Amatrice earthquake (Italy, August 2016). The animated video shows a set of events that take place inside a bedroom during an earthquake (Figure 6);

- Debate | Conversation with students is triggered by asking them if they think the video represents reality or fiction. Students are invited to try to visualize likely effects of an earthquake on their own room, providing a vision of the problem and an opportunity to personalize the threat.

Figure 6. Video frame from the moment when Bruno manages to exit the room.

consequences and it is considered to stimulate people to act.

Competences- The last stage of the Becker et. al (op. cit) model is the development of competences. Once the threat has been interiorized, individuals try to acquire the practical knowledge and the necessary tools for the adoption of protective behaviours. Regarding the intervention, this stage was planned in a way that would allow students to create an object, on which they could be able to develop a set of skills aimed to perceive both the vulnerability and resilience areas of a house; as well as to define and apprehend the attitudes to be adopted in case of earthquake, both inside and outside.
During two 90-minute sessions, students were invited to develop a set of skills under the concepts they got to know during the previous stages of the KnowRISK intervention (figure 7). Each group of three students worked on one specific room (living room, office, kitchen, bedroom), managing a set of tasks:
Assemble a given set of furniture according to the house division. This activity is intended to allow individuals to have an active role on actually building the house model;

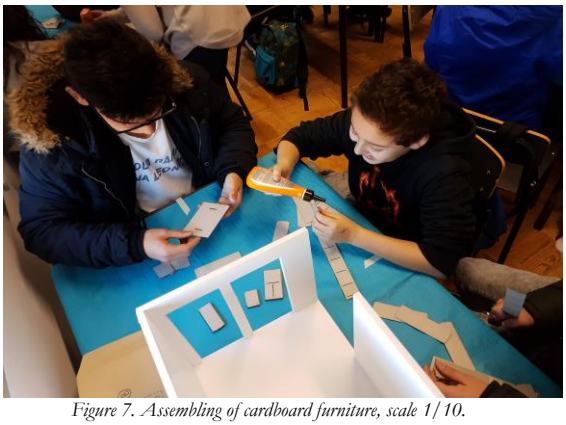

Figure 7. Assembling of cardboard furniture, scale 1/10.

Display the furniture set freely inside the room. In this stage students were not forced to organize the rooms safely, they could display furniture and objects the way they liked.
Assemble the several parts together, in order to have the complete house and shake the model in a way to simulate the action of an earthquake (Figure 8). This shaking test and its consequences allowed students to have a clear vision of the effect of an earthquake inside a regular house. Individuals are invited to take a close look at the house area they were working on and identify the main problems;

Figure 8. House model after shake test.

With the effects of the earthquake in mind, students go back to work and are able to rearrange the furniture in a safer way. After a correct display of furniture, students were invited to simulate other protective measures such as fixing tall furniture to the walls;

moving heavy objects to lower shelves; moving beds away from windows or, even, place heavy curtains on windows to prevent broken glass to spread through the room (Figure 9 and 10).

Figure 9. Students handle last details of their room. Photography taken by Nuno Patrício - RTP Notícias.

Once the intervention ended the resultant house models are now objects that individuals who took place in the KnowRISK project may use to communicate risk to others. The fact that students took their time to prepare the models and to make signs with the adopted non-structural protective measures makes possible the communication of vulnerabilities and resiliencies found inside regular household spaces. We believe this a chance not only to empower the individuals responsible by making the model but also to get the information to a larger group of people.

Figure 10. Completed house models during debate on "Before, during and after an earthquake".

1.2.2.1 *Outside schools*

BLA BLA


KNOW RISK
Know your city, reduce seismic risk through non-structural elements
O KnowRISK é um projeto sobre risco sísmico e medidas de proteção não-estruturais que tem como uma das suas tarefas a comunicação de risco.
Neste âmbito, surge a intervenção KnowRISK que se organiza em quatro fases: conhecimento, diálogo, visualização das consequências de um sismo e desenvolvimento de competências.
CONHECER
O que é o risco sísmico?
Quais os principais riscos não-estruturais?
VISUALIZAR
DIALOGAR
Como pode um sismo afetar o meu quarto?
Visita ao LNEC
(Laboratório Nacional de Engenharia Civil)
Conversa com ESPECIALISTAS
(LNEC, IST e Proteção Civil)
Quem quer estar a salvo?
CONCURSO
A história do Bruno | Amatrice, Itália | Agosto 2016
DESENVOLVER COMPETÊNCIAS
MAQUETE
1. Organizar o mobiliário
2. Simular um sismo
3. Reorganizar
4. Aplicar outras medidas de proteção
5. Sinalizar as medidas

1.2.3. Remarks on the experience

Once the intervention on the two Portuguese schools is now over it is possible to make some considerations on the process. As stated in the beginning of this deliverable, the KnowRISK was intended to raise awareness among school community on the seismic risk problem in Lisbon. The main objective was to stimulate the adoption of protective behaviours.

Despite the fact that the target group, ages from 12 to 15 years-old, may fail to influence the decision-making process of adopting protective measures inside their household space, after the intervention we tend to believe that the skills developed during the KnowRISK project may be used by the individuals later on in their lives.

Regarding the theoretical model adopted for this intervention, we believe that, if implemented correctly, it provides individuals a set of information and tools that can prepare them to act protectively. Of course, either they act on it or just develop behaviour intentions. During the process in both schools, we realized that by the time students reached stage four, development of skills, they already knew and comprehended a given set of non-structural protective measures. In this scenario, the house model activity represented a great moment when students were able to act and put into practice the concepts they discovered during previous stages.

Regardless of the successful implementation of all proposed actions, some questions remain to be answered: is this the way to communicate risk to this target group? Is this the right age to communicate risk? How are these individuals going to adopt such measures?

1.3 THE ITALIAN CASE

In Italy seismic hazard covers a broad range of situations: from high to low and with PGA at bedrock ranging from 0.3 g (and higher) to lower than 0.025 g (Figure 11). Recent earthquakes (Mw5.9 2002 Molise, Mw6.3 2009 L'Aquila, Mw5.8 2012 Emilia and the Mw6.0 2016 Amatrice) have shown that damage caused by non-structural failures can be relevant. Nonetheless awareness on the need of preventative measures to reduce risk related to non-structural elements is presumably low as the major concerns always go into the structural vulnerability. In some sense the fear towards structural failure is an obstacle to the prevention of non-structural damage. To avoid this obstacle - that is an element of disturbance for the "what" in the communication strategy- we deliberately choose to implement communication strategy starting from areas of middle-to-low seismic hazard.

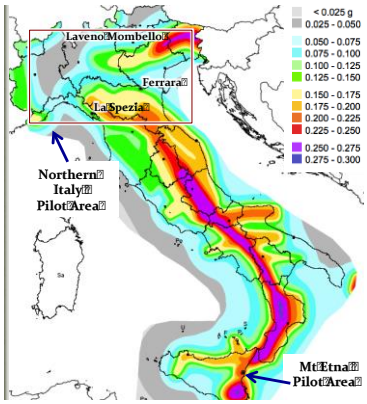

Figure 11: Pilot area are plotted on the seismic hazard map colour coded PGA for excedance probability of 10% in 50 years

Pilot area for **"Know your school: be safe"** are specifically chosen to (1) profit from previous school board involvements in science communication activities implemented by INGV and (2) implement communication covering a broad range of seismic hazard, allowing a high potential to be replicated.

Mt Etna pilot-area is characterized by low to moderate earthquakes, the magnitude of which rarely exceeds Ml 5. However, the seismic foci are often shallow and can consequently create serious damage in restricted areas. For this reason and for the high occurrence frequency of earthquakes, it is important to disseminate information on seismic hazard among students and laypersons, and explain what each of us can do to reduce the damage of earthquakes.

Northern Italy pilot-area experienced a recent earthquake in 2012 (the Emilia sequence) with widespread non-structural damage. Within this pilot-area we choose the following two communities: La Spezia and Laveno Mombello (Varese province). In La Spezia earthquakes may be strong but they are rare. In Laveno Mombello they are rare but Seismic Building Code for public buildings (i. e. schools) is enforced.

1.3.1.1 *A robust schoolboard involvement*

To implement science communication in schools we needed to have a robust school board involvement. Schools involved in KnowRISK belong to an established network of collaboration with INGV. For the past 10 years, and more, dissemination and science outreach programs specifically devoted to schools have been implemented in the many locations of INGV thought the country.

In **Mt Etna pilot-area** INGV hosts in Catania every year science outreach events where Schools and stakeholders are involved, and discuss with scientists issues concerning earthquakes.

In KnowRISK we hosted schools at INGV and implement our communication action with the use of Augmented Reality tools that are described in Deliverable E4.

In **Northern Italy pilot-area** INGV had run science outreach activities at schools in the city of La Spezia and in Varese province approaching more than 20 000 students and teachers for the past 10 years. They all pose an alternate approach to vulnerability reduction, which is based on the building-up of knowledge.
In the area of La Spezia ERiNat (Education to Natural Risk) was an educational project on seismic, hydrogeological and forest fires risk mitigation, which started in 2004 and addressed students of middle school. The project included a learn-by playing approach in the form of a formal contest and summer camps and open question seminar sessions. Evacuation drills at school were carried out, under the control of fire fighters and civil protection volunteers, in order to report what needs to be done to improve school safety.
In the Varese province a well established collaboration between INGV and local schools allowed in the past years to implement two science communication modules: "Natural Disasters" and "Knowing the Earth" (Musacchio et al. 2012). Here we worked more on basic science knowledge since earthquakes in the area are rare, but Seismic Building Code for public buildings (i.e. schools) is enforced. These modules include inductive learning and open question seminars always followed by hands-on activities or films on specific aspects concerning the basic science behind the phenomena, the hazard and the risk.

1.3.2. Principle of intervention: engagement with flipped up learning strategy

"Know your school: be safe" stands on a participatory flow that passes from understanding, through observation, to build **knowledge**, act on **attitude** and ends with **practice**. The flow, summarized in Table 2, is a variation of Becker's et al 2012 and it differs from that followed in the Portuguese case study (Table 1). The main differences to Becker's approach are: (1) the assessment of pre-existing situation; (2) a dialogic framework; (3) flipped up learning strategy.

The **assessment of previous situation** is done with a T_0 questionnaire. It ensures a dynamic approach to students community: on one end it is a tool to assess KAP level and on the other end results from the T_0 questionnaire allow to go deep in the target community and tune up communication strategies according to specific needs.

The **dialogic approach** envisages the mentor as not the only one providing knowledge and good advises. This approach ensures mutual exchange of knowledge between experts and students, reinforces interest and allows a deeper anchorage of concepts and best practice. The dialogue is performed through a **T_0-focus group** at the beginning of the intervention in the school, and **T_1-focus group** at the end. They have different purposes: T_0 is a qualitative assessment of KAP level prior the intervention and open up to dialogue

with the expert; T_1 provides a qualitative assessment in changing KAP, yet enabling to go more in-depth than the ex-post questionnaire, and reinforce acquired knowledge.

The **Lecture** is required to implement knowledge that teachers might not be able to provide. Experts at school bring their individual approach to communication. In areas whit low seismic hazard we have added, within the flow described in Table 2, two more lectures describing general concepts of plate tectonics and earthquakes. This has been required by the school board to ensure a better understanding of the phenomenon and the need to run preventative programs.

The **flipped learning** strategy is a way to engage in risk communication and derive participated best practice. It is based on Situated Learning Episode, EAS, (Episodio di Apprendimento Situato; Rivoltella, 2014) where active learning strategies are used to enhance knowledge, skills and attitudes. The learning is flipped-up: homework for learning and skills; classwork for reworking and understanding. KnowRISK implemented an EAS for reduction of risks posed by non-structural elements in buildings.

Table 1. "Know your school: be safe" schools participatory flow in Italy

TYPE OF ACTION	N°	ACTION	DESCRIPTION	SUPPORT MATERIAL	DURATION	OBSERVATIONS
ASSESSMENT OF PERCEPTION	1	**Survey T_0**	At home	on-line questionnaire	30 min	
DIALOGUE	2	**T_0-Focus Group**	At School Assessment of previous knowledge and opinion on hazard and risk. Establish a participate knowledge	Images and project brochure	1 hour	The debate should try to understand students opinions and push them to make free observations
KNOWLEDGE	3	**Lecture** [*What kind of damage have earthquakes produced in Italy?* or *Earthquakes: where and how?*]	At School Fire Brigade will document disasters caused by earthquakes in Italy. Emotional learning: story-telling based on personal involvement _____or_____ Scientist will run a hands-on activity on seismology	Photos _____ Miscellaneous	1 hour	If we can profit from the support from the Fire Brigade the lecture will be on damage and earthquake story-telling. If a scientist is the lecturer an hands-on and interactive seminar is given
VISION AND DEVELOPMENT OF CONSEQUANCES	4	**Flipped-up learning strategy**	At home and short input at school Active learning phase: Home-works [EAS]	Video [Shake table Video or Augmented Reality Tool]	10 min in class and free length at home	Students will be asked to prepare a product that think effective in communication risk related to non-structural elements and best practice
DIALOGUE	5	**T_1-Focus Group**	At School Assessment of effectiveness Reinforce of knowledge	Images, Videos, music, presentation, posters, checklist	1 hour	Students will present their products to the class. Discussions and shared knowledge
ASSESSMENT OF EFFECTIVENESS	6	**Survey T_1**	At home	on-line questionnaire	30 min	

1.3.2.1 *The KnowRISK EAS*

EAS is a modern view to teach and learn by mean of microcontents to implement microlearning (Patchler et al., 2010) and enhance students' problem-solving skills. The classroom is rethought as a lab where lessons become workshops with experts.
For a detailed description of EAS and its use in resk education see Rivoltella (2014) Piangiamore et al. (2015).

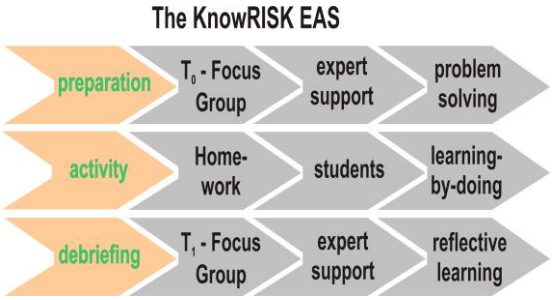

Figure 12. The KnowRisk-EAS scheme to address non-structural elements of earthquakes. Experts support are only required in the preparation and debriefing phase. Students are involved in an active learning process where homework is for learning and classwork is for reworking and understanding .

The first step on EAS (Fig. 12) is the *Preparation phase* where the learning strategy is problems-solving. Here the mentor's action is to build the conceptual framework, presents it to the students in dialogic form, give inputs and assign homework. The inputs need to be short-shoots of videos, presentations, and a text that can catch attention, raise the needed curiosity to do the homework.
In the second step, the *Activity phase*, learn by doing is the learning strategy; the mentor sets the activities time and allow students to work on their own. Students are asked to prepare a digital product that responds to the inputs given during the activity phase. They will be given a list of websites where to search for additional information, derive in-depth contents and be inspired for the preparation of the product.
In the third step, the *Debriefing phase*, reflective learning is activated and cooperation is a crucial strategy; the mentor makes assessments, discusses misconception and define concepts while students analyse schoolmates products, discusses with them and reflects on products and processes.

The **KnowRISK-EAS** starts (Fig. 12) and ends with two different focus groups, in the preparation and debriefing phases, where students and teachers meet researchers and fire brigades to rework and restructure concepts to come up with the appropriate behaviour towards non-structural elements.
The **T_0-focus Group** lasts about 90 minutes.

- *Warming up*- It starts with a simple discussion on the distinction between hazard and risk triggered by images that recall situation to which students are familiar with (Fig. 13). As the discussion goes deeper and deeper we end up asking the students if they think it is possible to remove risk (Fig. 14). This part is structured in such a way that the students are encouraged to talk, to discuss among them and, above all, reasoning to understand the concepts proposed. Only the ability of the experts can make the stimulating discussion and open the minds of the children. Scientists should be able to modify their attitude, language and level of interactivity depending on the different audiences they encounter, to not ever make banal the discussion.
- *Core of discussing*- After discussing the fundaments of hazard, vulnerability and risk students are led to the corresponding seismic concepts. We show a seismic map of Italy and recall the concept that natural hazard cannot be removed and the need for prevention.
- *Summing-up*- By the end of the focus we stay on what is non-structural vulnerability (Fig. 15). The image shown in figure 3 was used during the test phase and will be replaced by the Brochure we specifically designed for students (see Appendix A).
- *Approach reality*- Here students interact with the Fire Brigades that present a lot of images and discuss with students on real episodes and situations of danger they have experienced or they know about. They suggest how situations should be addressed and how they can be resolved. This is the part when usually students have a large participation with questions and allows students to catch the real situation aspects: they understand they are not told just abstract concepts, but unfortunately situations that can really happen.

Figure 13: Images shown to trigger discussion during To-Focus group. The focus is on the distinction between hazard and risk, addressing vulnerability and exposure

Figure 14: Images shown to trigger discussion during T0-Focus group. The focus is on "Can we remove hazards?"

Figure 15: Images shown to trigger discussion during T0-Focus group. The focus is on what are those non-structural elements that belongs to the way we arrange our apartment: " Is it just a messy room?"

The T0-Focus group ends with a 30 minutes lecture on the basic concepts of seismology and seismicity in Italy.

The **homework-** Here the stimulus is a video addressing specific risky situations. In the final stage of the KnowRISK-protocol of intervention for school we will use shake-table videos and augmented reality products specifically prepared by the project.
The goal of our intervention goes beyond the spreading of knowledge and rising of awareness. We want to come up with a shared strategy for risk communication in schools. For this purpose students are asked to prepare a tool to communicate risk reduction strategies to their peers. In the assignment we suggest to explore specific web-links that we have verified be giving correct information (Appendix A).
To trigger more interest we set a contest entitled "Are you running too many risks?". The competition is open to students in classes that have joined the project "Know your school: be safe!". They can participate in the competition with digital products that express the point of view, their suggestions addressed to their peers, but with the intention to convince families and/or politicians and administrators of the importance of using measures non-structural damage prevention. The contest revolve around the following issues:

- We know the damage caused by earthquakes on non-structural building components (furniture, ceilings, partitions, panels, plants ...);
- We prevent damage for people and costs;
- We learn to protect ourselves by adopting proper strategies to secure furniture and behaviours;

- We are supportive: we become small Fire Brigade and Civil Protection of the small operators for us and our families by promoting non-structural seismic risk reduction best practices.

In the **T1-focus group** at school the same expert of the T_0-focus group, together with students and teachers, analyse students' products and manage the comment on them to reinforce active citizenship and best practice for seismic risk mitigation through non-structural elements. This is the contest for students to describe their products as authors to all. Students and researchers reflect together on the student's products. Students listen to their classmates explaining their products. This is not the classic lesson of a professor, but a peer-roundtable set to build a shared knowledge. Often the products developed by the students, even within the same class, address the issues of non-structural damage, from different points of view. This allows scientist to describe the differences of the various products and point out the importance to look at problems from different perspectives. In the explanations of the products the students have fun and this helps to process more easily difficult concepts, which will therefore be retained in their mind. Eventually students will disseminate their knowledge and act on implementation of preventative measures.
If necessary the dialogue continues with a lecture to reinforce the concepts of hazard, vulnerability and exposure. In many cases the discussion on the homework produced by the students was so inspiring, engaging and full that the lecture was unnecessary

1.3.3. "Know your school: be safe" in action: the Italian case

1.3.3.1 *At school and for schools*

In KnowRISK we engaged the third classes of Middle schools (ISCED 2) and the first and forth classes of High schools (ISCED 3) (Tab. 2). Our targets audience is 13-15 years old students in the city of La Spezia and its province (Lerici, San Terenzo and Sarzana) and Laveno Mombello (in the province of Varese). The lectures were given by three KnowRISK team members whom are seismologists having a 10 years experience in science outreach for schools. Two of them have a degree in science communication. In La Spezia we could profit from the support of fire brigades.

Table 2: list of schools participating to "Know your school: be safe!"

Middle Schools (ISCDE 2)				
Location	**Name**	**N° Classes**	**Level**	**N° Students**
La Spezia city	J. Piaget	10	III	201
La Spezia city	U Mazzini	4	III	96
Lerici (La Spezia)	F. Poggi	2	III	45

S. Terenzo (La Spezia)	P. Mantegazza	1	III	21
Laveno Mombello (Varese)	G. B. Monteggia	10	III	230
Comerio (Varese)	IC Campo dei Fiori	2	III	50
Catania	IC San Domenico Savio	3	III	70
High Schools (ISCDE 3)				
La Spezia city	A. Pacinotti	3	IV	81
Sarzana (La Spezia)	T. Parentuccelli - Arzelà	5	I	140
Varese	Sacro Monte	4	III-IV	80

We started during the school year of 2015-'16 involving in KnowRisk project the third classes of the Middle school "J. Piaget" of La Spezia with 5 classes for more than 100 students and of the Middle school "G. B. Monteggia" of Laveno Mombello (Varese) with 3 classes for more than 60 students (example of activities in Fig. 16).

Figure 16. Photographs of the Focus Groups.

We continued with the KnowRisk action in the schools involving in the third class of the Middle school "J. Piaget" (5 classes, about another hundreds of students) and "U. Mazzini" of La Spezia (4 classes for almost one hundreds of students), ISA 10 (2 classes of the Middle school of "F. Poggi" of Lerici and 1 class of school "P. Mantegazza" of San Terenzo for about 70 students), "G. B. Monteggia" of Laveno Mombello (3 classes for about 70 students).
The class 3E of the Middle school "J. Piaget" from La Spezia will go to Lisbon for a peer-education experience with the students of the Middle school "Padre António Vieira" in May 2017.
The students prepared a long list of that we included in Appendix C. In figure 17 a,b,c are shown snap-shots of the students products.

Figure 17a. Examples of homework: on the left, video-pill of non-structural damage in a butcher's shop in Norcia; on the right, the video of likely damage in the case of non-structural risk.

Figure 17b. Example of homework: a room by room inventory of likely non-structural damage at school.

Figure 17c. Example of homework: video of the behaviour of a scale model of a bedroom.

The action in schools ended in the fall 2017-winter 2018, when we also engaged schools from Catania in the Mt Etna pilot area, where the level of hazard was higher than in Northern Italy.
The last sets of intervention in the Northern Italy pilot area involved 6 more classes (150 students) and were usefull to tune up specific aspects on the Knowledge phase that we found be important to point out in order to achieve a higher level of awareness and need to take action towards safety. Students produced about 20 digital risk comunication products that we will be upoloading on the project portal.

1.3.3.2 *Outside schools*

The scheme presented in Table 1 was adapted to be used when engagement of students is done outside the school framework. Here major constraints are: the *one-shot* event and the limited time we can count on. In a single event we have to set up a protocol that will act on KAP passing from engagement and be flexible to specific situations. The impact in terms of number of students involved was relevant as up to now we have reached about 1350 students.
We have tested the T_0-Focus group, the Lecture and hands-on activities within the following science outreach events: *ScienzAperta* (May 12-21, 2016), *TutelaSpezia* (October 1-2, 2016), *La Settimana del Pianeta Terra* ("The Week of Planet Earth"; October 16-22, 2016), *Bimbi per Bimbi* ("Kids for kids", November 2016) and *Terremoto in Piazza* ("Earthquake in city squares"; November 20th 2016), *Volalibro* (6-10 March 2017).

ScienzAperta is an outreach event that INGV offer every year to general public.

In Milan (Northern Italy pilot area) we engaged more than 200 middle schools students with T_0-Focus group, a hands-on activity and team group games that trigger reflexive thinking on non-structural elements. "*La Catena*" (The Chain) is a game with

words linked one to the other in a chain and all depicting an aspect of seismic hazard, risk and non-structural vulnerability. "*Trova il rischio*" (Spot the risk) is a visual game where students are provided with images on apartment interior and have to spot the risk related to non-structural elements.

In Catania (Mt Etna pilot area) students tested the first prototype of the KnowRISK exhibit with Augmented Reality applications. The exhibit was open to visitors (students and public) during ScienzAperta at INGV Catania, Italy, during the 5-day-long event, from 16 to 20 May 2016. The total number of persons who visited the exhibit was about 600. The exhibit made them aware of the potential danger of heavy furnishings above their bed or close to doors, causing injure or hindering escape in case of fall.
TutelaSpezia is a festival of civil protection and best practice that was held in the city of La Spezia. It engages public, scientists, policy makers and schools. Here we run only the Lecture activity of table 2. We have addressed elementary school students with a *scientific story-telling* activity.

La Settimana del Pianeta Terra (The Week of Planet Earth) is a geoscience outreach event that every year involve scientists spread all over the county. KnowRISK participated with the following events:

- "*Rischio sismico e ambientale: tra conoscenza e mitigazione*" (Seismic and environmental risk: between knowledge and mitigation), Lerici (La Spezia) with the scientific games for schools "*Trova il senso... con il rischio"* (Find the sense.... with the risk) http://www.settimanaterra.org/node/2067.

- "*Tra terremoti e dissesto idrogeologico: un paese di pericoli*" (Between earthquakes and idrogeologic instability: a country with many hazards) , Varese with scientific games for schools and excursion in collaboration with Parco Campo dei Fiori. http://www.settimanaterra.org/node/2069

In the city of La Spezia and Varese we have engaged students with Focus group on the concept of hazard-risk-vulnerability-exposure, hands-on activities, team games and lectures. In the city of Ferrara we engaged old downtown citizens with the role game Play-decide, a tool to discuss with the public how to best manage an earthquake emergency. Participants were about 100 students.

Bimbi per bimbi (Kids for kids) is a support action that schools of Viareggio, a town located about 60 km south of La Spezia, take towards schools hit by the 2016 seismic sequence in Central Italy. The knowRISK project participated with hands-on activities (Lecture in table 2) at school in Viareggio and in town squares (in Fivizzano) involving about 100 students.

Volalibro (Flying book) is a "festival" of the culture for children. INGV was involved in the IX edition, which was held at Noto (Italy) from 6 to 10 March 2017. Theme of the activity proposed by INGV Osservatorio Etneo was "*Italia: lo stivale ballerino*" (Italy: the dancing booth), which explained what each of us can do to reduce non-structural damage caused by earthquakes. About 350 pupils and students from primary to secondary school

followed an "interactive path" created by INGV personnel in collaboration with Dr. Simona Caruso and Pier Raffaele Platania in the school "Melodia" at Noto. The path encompassed slides, videos, the game "Treme-treme", and a special exhibit with Augmented Reality applications developed by partners of the KnowRISK project

1.3.4. Remarks on the experience

The students and the school community very well received the action.
Once all the tools the project is preparing will be ready and accessible we can include them into the KnowRISK-EAS.
Even though the action involved a large number of students (about 1800) we had many more requests from the schools that we could not accomplish because of the limited time and resources. The experience was fretful. We have collected about 100 products prepared by the students and we are now on the process of selected the best three that will be disseminated through the project web page.

1.4 THE ICELANDIC CASE

The Icelandic case study area has some peculiar features. The case study area in South Iceland has experienced three moderate to large earthquakes since 2000. The most recent of these earthquakes was the Mw 6.3 Ölfus Earthquake that occurred near Selfoss, the largest town in South Iceland. Most of the school children in the age group targeted in this action have some experience of the earthquake. Fortunately, failure and collapse of buildings did not occur. On the other hand, significant non-structural damage occurred, and moving objects insides residences caused some injuries. The people living in South Iceland are generally aware of earthquakes and their consequences, and are well informed about residential safety during earthquakes. School children of different age groups visit the Earthquake Engineering Research Center (EERC) every year. During such visits, the children are taught about the nature and effects of earthquakes in general. They are also given an overview of the seismic hazard in the area they live. In addition, they are trained to act safely during earthquakes. During these trainings, the children participate in rearsheal activities, and are taught safety measures such as seeking shelter, holding on to stable objects, maintaining balance and remaining calm until ground shaking is over, and being aware of moving objects around them. They are taught to be aware of their surroundings, and to maintain a posture to protect their head and face.

1.4.1. The approach

Assuming that the school children are familiar with effects of earthquakes and safety measures, the approach used in Iceland was to conduct a quick intervention action, highlighting the most important issues. The intervention was envisioned to fulfil the objectives of (i) reminding them of seismic hazard and potential earthquakes in the area (ii) relating to their experience of the Ölfus Earthquake, with proper care so as not to instigate potential fear and trauma which some children might have experienced during

the earthquake (iii) stressing that earthquakes are quick events and last a very short period of time, and with proper building practice and other precaution measures in place, we need not fear them. It was felt important to stress that rather than instigating fear of earthquakes to the children, which might result in hopelessness and submission, it is more beneficial to portray them as a natural phenomenon, which in itself is not a problem, provided our homes and infrastructure are strong and resilient, and that we learn to live safely with earthquakes, as they are inevitable.

1.4.2. "Know your school: be safe" in action: the Icelandic case

The intervention action was conducted in a school in Selfoss. The name of the school is Sunnuækjarskóla, which is the second largest school in Selfoss. A subset of 63 students from the 8th grade was selected for the action (ISCED level 2). The action was divided into two parts: communication and demonstration. Some details of these actions are provided below.

Communication- This part of the action was conducted to the whole group of 63 students. Of these 63 students, 42 had completed the T_0 common questionnaire about a week before the intervention action, which was conducted on April 6, 2017. The communication action was meant as a means to disseminate knowledge about earthquakes and safety measures and to share the experiences of the children during the earthquakes they had felt. This action lasted for 80 minutes. During the first 60 minutes the children were given expert information about seismic hazard and risk, experience from the past, non-structural elements and protection measures, and how to act during earthquakes. This session was divided into four small lectures.

- ***Lecture*** I- The first lecture was given by a Professor in Civil Engineering, KnowRISK team member (Figure 18). It covered basic information about the seismicity of South Iceland, where earthquakes tend to occur, and how hazardous the region is compared to the rest of the world. Simple summaries of different types of damages sustained by buildings during the past earthquakes were also shown, emphasizing that non-structural damage was more frequent than structural damage in South Iceland.

Figure 18. Lecture I by Professor Bjarni Bessason about earthquake hazard and risk.

- ***Lecture II-*** The second lecture was given by an Earthquake Engineering Professor, knowRISK team member (Figure 19). This lecture showed videos and pictures of non-structural damage from the recent earthquakes in Iceland, and informed the students about how these damages could have been prevented.

Figure 19. Lecture II by Professor Simon Olafsson about non structural damage during past earthquakes in South Iceland, and preventative measures.

- *Lecture* III- It was given by an Earthquake Engineering Professor, knowRISK team member (Figure 20). The lecture focussed on how things inside a home move during and earthquake, and the risk of damage and serious injury due to their movement. Videos of the shaking of full-scale room model conducted at LNEC as a part of this project was shown to the students. They were informed that the experiment was performed on a real scale model and that the shaking corresponded to what had been recorded during past earthquakes in Iceland. These students seemed very impressed with the video. After showing the video

with furniture unanchored, different problems and potential hazard due to the movement shown in the video were discussed, and potential protective measures were mentioned. Then another video with the same experiment but furniture anchored was shown. It was felt that the contrast between the two videos was very useful to convince the students that even simple protective measures can make a lot of difference.

- ***Lecture* IV-** The last lecture was given by Elinbog Gunnarsdottir, manager of the EERC (fig. 21). She has been training school children at the EERC about what to do during earthquakes for more than 10 years. This lecture covered different aspects of how to be safe inside a house during an earthquake. It was emphasized that panicking and running can be hazardous, and that it is more sensible, in Iceland where buildings are strong, to remain calm and wait for ground shaking to be over. The children were also taught to remain aware of things moving around them and seek shelter if possible. They were advised to maintain balance and posture to protect their head and face.
- *Dialogue*- After the lectures, the students were encouraged to discuss with the experts their experiences from past earthquakes, and/or seek further information clarification on the knowledge communicated to them. Many students actively participated in this discussion, and some shared their experience from the 2008 Earthquake.

Figure 20. Lecture by Professor Rajesh Rupakhety about movement of objects inside house during earthquakes.

Figure 21. Lecture by Professor Rajesh Rupakhety about movement of objects inside house during earthquakes

Demonstration- For the demonstration part, the students were divided into two groups. The purpose of the demonstration was to make the students understand the difference between structural and non-structural elements, to show how things move inside a typical house, to demonstrate how such movement can be hazardous, and finally how they can be prevented. The end product of demonstration is act on Practice that is stimulated to undertake preventative measures.

- *The first part* of the demonstration focussed on structural elements of a building (see Figure 22). A scaled model built from balsa wood was displayed to the students and the different types of structural elements such as beams, columns, bracings, floor plates, and shear walls were explained along with the roles they play in carrying gravity and earthquake forces. The model was then mounted on a shaking table. Ground motion recorded in Selfoss during the Ölfus Earthquake was used to shake the model. The shaking caused considerable cracking of the joints of the structural elements and some of the beams and columns, but the building did not collapse. Another demonstration using the ground motion recorded in Kathmandu during the 2015 Gorkha Earthquake was made. During these shaking, the model suffered some damage but did not collapse. The students were informed that during strong shaking, structural elements may be damaged to some degree, but engineers aim to design them in such a way that they don't collapse. They were explained how a well-built structure can sustain even very strong shaking, which was obvious from these demonstrations.

Figure 22. A balsa wood model of structural elements of a building mounted on a shaking table.

- *The second part* of the demonstration concerned the movement of building contents during earthquakes. For this purpose, a scaled model of a typical apartment, based on the design of the LNEC team was built (see Figure 23). The scaled apartment model was mounted on the shaking table and students were asked to arrange furniture and other objects in the different rooms. The model was then shaken using ground motion recorded in Selfoss during the Ölfus Earthquake. After the shaking, the students were explained about the hazard caused by the movement and toppling of different furniture and objects inside the rooms. They were asked to idenity potential problems, to which they responded very well. Engagement of students was in rearrange the furniture to minimize hazard. They were very careful, and moved heavy objects away from beds and door openings. Finally, they were informed about simple protection measures like fixing the furniture to the walls and storing heavier objects at lower levels of the shelves to reduce potential danger caused by their falling. The same sequence of demonstrations were then repeated to the second group of students.

Figure 23. From top left to bottom right, the scaled house model, students arranging the furniture, and students being taught about the movement of objects, potential hazard, and protection measures after shaking.

1.4.1. Remarks on the experience

The communication and demonstration activities were very well-received by the students and the teachers. The communication actions were divided into four well-defined themes. The students actively participated in discussions after the communication actions. The demonstration action was also found to be very effective. The hands-on nature of the demonstration was found to be very useful to involve the students and involve them in the learning process. The demonstration of structural elements and non-structural elements separately helped us to clarify to the children the different nature of risk posed by them, and that while structural defects and damages are difficult and expensive to mitigate and repair, non-structural elements can be made safer very easily using simple methods and tools. This is very crucial in Iceland where buildings are strong and non-structural damages are of main concern. The event was covered in local newspapers (see Figure 24), and well-received by the local communities. There have been several requests to make similar demonstrations at other schools as well. We learnt that taking the shaking table and other equipment to the schools requires a lot of time and effort in planning and execution. Keeping this in mind, and considering the fact that groups of school children from different schools visit EERC several times every year, we have decided to incorporate the models and tools developed in this task during such visits and re-model our regular awareness raising activities based on the experience gained from this task.


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FRÉTTABLAÐ
Miðvikudagur 12. apríl 2017
Nr. 2392
Nemendur sáu eftirlíkingu af jarðskjálfta

Figure 24. Coverage of the KnowRISK action in a school in Selfoss in the mainpage of local newspaper Dagskrá.

1.5 EXCHANGING EXPERIENCES

The experience made in different pilot areas and countries, now under validation, are also a matter of exchange. Students from the school J. Piaget of La Spezia (Northern Italy pilot area) will meet their peers in Lisbon next May. They will visit the traces of the Great Lisbon Earthquake and have a look to typical non-structural elements for the city of Lisbon. They will be visit LNEC and participate to the contest "Who wants to be safe?". Questions have been adapted to local needs of Italian community.

1.6 CONCLUSIONS

The actions undertaken in the three countries involved students of ISED level 1 and 2 that interacted with experts, member of the KnowRISK team, in a process of mutual learning. The dialogic approach stood under each project partner action, but it was put into practice in a different way.

The Portuguese team focussed on the building of knowledge and development of competences as the bottom line of the action. This might not lead to preventative measure be undertaken, but it will at least open the way to the raise in awareness.

The Italian team stressed more on the peer-to-peer communication asking the students to prepare a product in which they should convince their peers of the need to take

preventative actions towards the potential harm that non-structural elements may have in case of an earthquake.
The Icelandic team stressed that even though structural defects and damages are difficult and expensive to mitigate and repair, non-structural elements can be made safer very easily using simple methods and tools.
The involvement of "Know your school: be safe" was different in each country, depending on the level of school board involvement, the existent of an already established school network collaborating with project partners, and the in-depth assessing of topics revolving around the issue of non-structural elements.
The action in Portugal was the longest and with the most in-depth assessment because of the low awareness of the seismic risk in the city of Lisbon. It Iceland the action was the shortest and quickest because local community are quite familiar with seismic hazard, building are more resistant to the shaking that in the other two countries. Nonetheless people are not aware that non-structural elements can cause damage and injuries.
In Italy the action was intermediate among the other two regarding the length and in-depth assessment of knowledge. However, in low seismic hazard zones it was required to add two more lectures to the Italian protocol of intervention to establish more in-depth knowledge.
The length and level of details of the issue had consequences on the number of students involved in the campaign: in Lisbon about 108, in Italy almost 1800 (800 with experts at school and the remaining with outreach events), in Iceland 63 students.

The action is now under validation and after that we aim at deriving a shared protocol of intervention with modules that applies to local communities needs.

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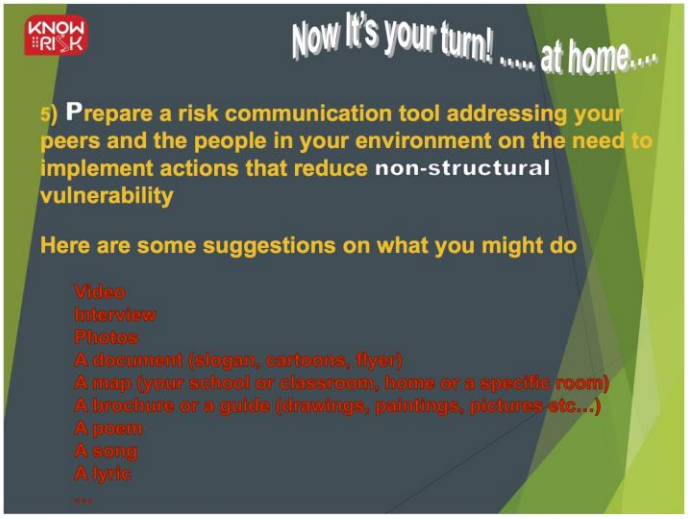
1.7 APPENDICES

APPENDIX A. The KnowRISK-EAS: homework

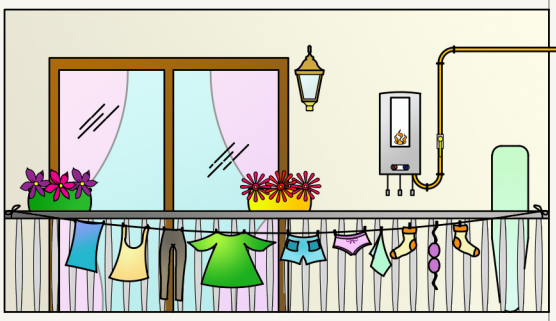

Now It's your turn! ..... at home....
5) Prepare a risk communication tool addressing your peers and the people in your environment on the need to implement actions that reduce non-structural vulnerability
Here are some suggestions on what you might do
Video
Interview
Photos
A document (slogan, cartoons, flyer)
A map (your school or classroom, home or a specific room)
A brochure or a guide (drawings, paintings, pictures etc...)
A poem
A song
A lyric
...

APPENDIX B. Brochure on non-structural elements for the Italian schools

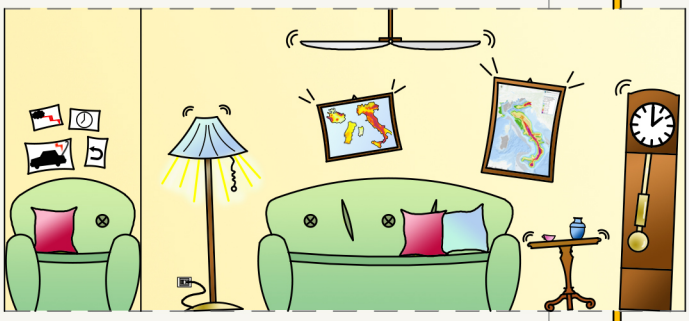
APPENDIX C. List of digital products prepared by the students in the Italian pilot areas

FISSA lampadari, specchi e apparecchi elettrici

ASSICURA lo scaldabagno e gli oggetti instabili sulle ringhiere dei balconi



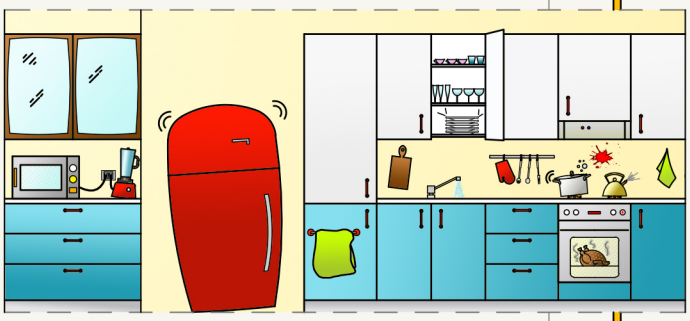
FISSA ventilatori a soffitto, lampade, quadri, mobili



FISSA il frigorifero

RINFORZA pensili e ante

IMPARA a scollegare gas, elettricità e acqua



KNOW YOUR CITY

Reduce sismic risk through non-structural elements

TÉCNICO LISBOA

LABORATÓRIO NACIONAL DE ENGENHARIA CIVIL

Istituto Nazionale di Geofisica e Vulcanologia

EARTHQUAKE ENGINEERING RESEARCH CENTRE UNIVERSITY OF ICELAND

European Commission

Co-financed by European Commission's Humanitarian Aid and Civil Protection Grant agreement ECHO/SUB/2015/718655/PREV28

Mitigare il rischio sismico significa limitare i danni procurati dai terremoti. **KnowRISK** aiuta la popolazione a ridurre i danni non-strutturali causati anche da deboli scosse e realizzerà una Guida Pratica gratuita con i suggerimenti a basso costo per tutte le abitazioni!

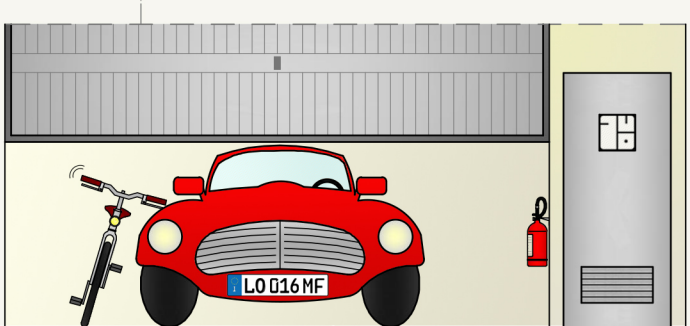
VUOI CONOSCERE IL RISCHIO SISMICO DELLA TUA ZONA?

KnowRisk produrrà mappe di rischio in aree pilota di Italia, Portogallo e Islanda

Il 70-85% del valore di un'abitazione è determinato dai suoi elementi non-strutturali: **architettonici** (tamponamenti esterni, pareti divisorie interne, controsoffitti, cornicioni, comignoli), **arredi** e **impianti** (elettrico, idrico, fognario e gas). **Riduciamo i danni non-strutturali insieme!**

www.knowriskproject.com
infoscuole@knowriskproject.com

ENTRA NEL MONDO KNOWRISK



Ideato e realizzato da Lisa Orlando e Marco Faggioli

CIASCUNO DI NOI PUÒ RIDURRE I DANNI NON-STRUTTURALI, COMINCIA ANCHE TU!

Individua tutto ciò che non è strutturale, a casa e a scuola

FAI LA DIFFERENZA: FISSA - ASSICURA - RINFORZA

REWIND...

FISSA librerie, mensole, computer e componenti elettriche (pericolose e costose!).
Usa appositi ganci per quadri e specchi.
Togli gli oggetti pesanti da sopra il letto!

Il RISCHIO SISMICO è determinato dalla combinazione di tre fattori: **sismicità** dell'area, **vulnerabilità** degli edifici ed **esposizione** della popolazione. Non possiamo fermare i terremoti ma **possiamo** ridurre i DANNI NON-STRUTTURALI agendo su vulnerabilità ed esposizione. Causati anche da deboli scosse, i danni non-strutturali possono ostruire vie di fuga, causare morti e feriti e ridurre la capacità di ripresa dell'intera comunità

School year 2015-2016: ISA 1 "J. Piaget", La Spezia (Northern Italy Pilot Area)

Class	Authors	Title	Lang	File type	Product	topic	Fname
3 A	Buschini Ricci		ITA	pdf	hand drawn comic	non-strucural damage prevention	
	Scappazzoni Lorenzo & Bertonati Alberto		ITA	ppt	ppt presentation of the check lists of Lorenzo's and Albetro' s bedrooms	non-strucural damage prevention	
	Adami Giulia, Adami Marina & Deda Alessia		ITA	mp4	movies with students acting	safety behaviours in different situations	
3 B	A. Tedesco, B. Bertirotti	Progetto Terremoti	ITA	mov	video pill	non-strucural damage prevention and safety behaviours indoor and outdoor	
	Guza Jennifer, Elisa Mezzadri & Emanuele Fadda	Prevenzione Terremoti	ITA	mov	movies with students acting and interviews	safety behaviours, non-strucural damage	
3 D	Tea Bollentini		ITA	mp4	video spot with text and images made by vivavideo	non-strucural damage prevention	
	A. Andò & A. Tabacchiera	Guida alla sopravvivenza in caso di terremoto	ITA	pdf	hand drawn comic	non-strucural damage prevention and safety behaviours	
	Diletta Mangano		ITA	pdf	text and classroom map	safety behaviour and seismic risk prevention	
	Sanuele Miglio & Marco Serra	Fate attenzione ai terremoti	ITA	pdf	hand drawn comic	rescue by fire brigade and safety rules	
3 E	All students	Rivisitazione Autunno		mp3	music recorded ai school plying flute	the sound of earthquake	

School year 2016-2017: ISA 1 "J. Piaget", La Spezia (Northern Italy Pilot Area)

Class	Authors	Title	Lang	File type	Product	topic	Fname
	Maria Rosaria Favetti		ITA	mp4	video pill	non-strucural damage prevention	
	Gianmaria Morvillo & Ken Mervile	KR-cards	ITA	ppt	ppt presentation of the rules of the edu-game "KR-cards" made by students	non-strucural damage prevention	

3 A	Rebecca Cozzani, Elena Marano & Aurora Tesone		ITA	mp4	video editing of video, text and images ending with the shake movie of students's experiment of simulation of non structural damage in a doll's house. Made by Myvideo	non-strucural damage prevention	
	Filippi & Grillo	Cosa si fa in caso di terremoto a scuola?	ITA		video editing of text and images about safety rules ending with photos of Central Italy recent Earthquake. Music "Domani" Artisti Uniti per l'Abruzzo - dopo il terremoto a L'Aquila. Made by Puppet	non-strucural damage prevention through emotional learning	available at http://get-puppet.com/v/fN-ElwoP-Tc?autoplay=true
3B	Lorenza Ginesi, Emma Carro & Viola Frau	Know Risk project - Le nostre camere	ITA	ppt, pdf	ppt presentation, text, immages and interview	safety behaviours, non-strucural damage prevention	
3 C	Eleonora Paoletti & Michela Donatiello		ITA	mov	movies with students acting and text with safety rules	safety behaviours and non-strucural damage prevention	
	Bartoletti, Mannaioni & Mariotti	Progetto terremoto	ITA	avi	movies with students acting and text with safety rules	safety behaviours and non-strucural damage prevention	
3 D	Dalhoumi	Terremoti	ITA	pdf	text and classroom map	what is an earthquake, seismic waves and scales, seismic history	
	Duce, Lomabrado & Gaboardi	Attenzione ai terremoti	ITA	jpg	text and hand drawings	safety behaviours and non-strucural damage prevention	
	Menchini & Dobrota		ITA	mov	animatend presentation with hand drawings. Made by PowToon	safety behaviours and non-strucural damage prevention, curiosity about earthquakes	
	Francesca Suarat, Naomy Scarrica & Rosanna Calà	Fate attenzione ai terremoti	ITA	ppt	ppt presentation with text and immages	what is an earthquake, seismic history, safety behaviours and non-strucural damage prevention	
3 E	All students	Noi non rischiamo	-	pdf	check lists of classrooms (3D and 3E), scienze laboratory, teachers's room with plns, photos, suggested change to improve safety at school	safety behaviour	

School year 2016-2017: ISA 10 "F. Poggi", Lerici (La Spezia) - Northern Italy Pilot Area

Class	Authors	Title	Lang	File type	Product	topic	Fname
3 A	David Mana, Germani Arianna & Gabriel Cozma		ITA	mp4	movies with students acting and interview simulation. Made by Vivavideo	non-strucural damage prevention	
	Shelli Shurbaj & Matteo Terzano	KnowRisk rhyme	ITA	ppt	ppt presentation with rhymes read and related images	safety rules	
	Balestru & Baruzzo	Il terremoto	ITA	mp4	movies with students acting. Made by Kinemaster	non-strucural damage prevention	
3 B	Sophie Cappecchi, Sorana Gavril & Erica Bertagna	Rischi non-strutturali: i danni non strutturali del terremoto	ITA	mov	ppt presentation for a partecipative lesson peer to peer corredated by the shake movie of students's experiment of simulation of non structural damage in a room model. Contents also treated: the difference between tha structural and non-structural damage, the analisys of the room model and a quiz for the entire classroom with curiosity about earthquake.	safety behaviours and non-strucural damage prevention	
	Ginevra, Camilla & Bartek	Progetto terremoto	ITA	w4v	video editing of video, text and images ending with the shake movie of students's experiment of simulation of non structural damage in a doll's house	safety behaviours and non-strucural damage prevention	
3 C	all students		ITA	mp4	3 movies with students acting and interview simulation.	safety behaviours in different situations	
	some students		ITA	mp4	movies with students acting and comics drawings.	safety behaviours in different situations	
	some students		ITA	mp4	movies with students acting and interview simulation.	safety behaviours in different situations	

School year 2016-2017: ISA 10 "P. Mantegazza", San Terenzo (La Spezia) - Northern Italy Pilot Area

Class	Authors	Title	Lang	File type	Product	topic	Fname

3 A	Canale, Del Carria, Elmazi & Tincani	TG Terremoto	ITA	mp4	movies with students acting and TG simulation	non-strucural damage prevention and safety behaviours indoor and outdoor	
	Biasin, Rolla F. & Sarfi		ITA	mp4	movies with students acting and interview simulation to expert	non-strucural damage prevention and safety behaviours	
	Belviso, Bilotti, De Maria & Rolla M.		ITA	mp4	two short movies with students acting	non-strucural damage prevention and safety behaviours indoor and outdoor	

School year 2016-2017: ISA 6 "U. Mazzini", La Spezia (Northern Italy Pilot Area)

Class	Authors	Title	Lang	File type	Product	topic	Fname
3 A	Angelini		ITA	mp4	movies with students acting simulating an interview to an expert	non-strucural damage prevention	
	Siria Angelotti, Caterina Bertolini, Carolina Balsamo & Flavio Fantini	Danni non strutturali	ITA	ppt	ppt presentation	non-strucural damage prevention, check list and solutions to mitigate risk	
	some students		ITA	mov	movie with interview all around La Spezia to citizens and tecnicians about non structural damage experience and advice to mitigate risk	non-strucural damage prevention	
	Christian Bartoletti, Attilio Borio, Federico Massini & Mattia Rolla	Progetto KnowRisk	ITA	mp4	and advice to mitigate risk	safety behaviours	
	Sara Vanacore, Mattia Landi & Francesca Settanni	Il filo del terremoto	ITA	mov	animated drawings and advice to mitigate risk	non-strucural damage prevention	
	Francesco & Pietro	Terremoto: come ridurre i danni non strutturali	ITA	mov	Animated poster presentation with Sismoman as mascotte to mitigate non structural damage in every room at home	non-strucural damage prevention	
	Baldini		ITA	mp4	movies with students acting and comment with safety rules. Made by Flipagram	safety behaviours and non-strucural damage prevention	

3 C	Caravella		ITA	mp4	movies with students acting. Made by Movavi	safety behaviours	
	GDB	In caso di terremoto	ITA	jpg	poster	safety rules	
	D'Ippolito	Terremoto ad Amatrice	ITA	mov	Animated presentation made by Prezi. Rap lyric	non-strucural damage prevention	available at https://prezi.com/hgknpdm07nq9/progetto-know-risk/?utm_campaign=share&utm_medium=copy
	Arianna, Vittoria & Viola		ITA	mp4	movies with students acting	safety behaviours	
	Stevani	I terremoti	ITA		PowToon presentation	what is an earthquake and safety rules	
	Toncelli		ITA	mp4	movies with students acting and text. Made by Flipagram	non-strucural damage prevention	
	some students	Regole da seguire durante il terremoto	ITA	mp4	KnowRisk rhymes with music and images	safety rules	
3 D	Rosso		ITA	docx	Comics	safety behaviours and non-strucural damage prevention	
	ANTONIO COLOMBO, SACHA PICCIONI & GIACOMO PALOMBA	I terremoti	ITA	ppt	ppt presentation	what is an earthquake and safety rules	
	some students		ITA	mp4	movies about a plan	non-strucural damage prevention	
	some students	In caso di terremoto: 5 cose da non fare; 5 cose da fare	ITA	mp4	movies with students acting and text. Made by FilmoraGo	safety behaviours and non-strucural damage prevention	
	Elena Saggini, Alessia Gobbato, Bianca Maggiani, Anastasia Bonifazi & Anna Pepe		ITA	mp4	Video pill with comments	what is an earthquake, safety rules, non-strucural damage prevention	
3 E	Andreoli	La streda da percorrere	ITA		prezi presentation	non-strucural damage prevention	
	Galli, Fazio & Saloni		ITA		prezi presentation	safety behaviours and non-strucural damage prevention	

	Ghetti & Attolini		ITA		prezi presentation	non-strucural damage prevention	
	Picasso & Stretti	Terremoto KnowRisk	ITA		prezi presentation	non-strucural damage prevention	
3 F	Alessandro Scali, Alessio Corsini, Ginevra Rossi, Giulio Barilari, Claudia Palermo & Gabriele Bello	Aiuto Terremoto!	ITA	mov	movies and backstage with students acting and comment about safety. Made by iMovie	safety behaviours and non-strucural damage prevention	
	some students		ITA	mov	movies with students acting with the shake movie of students's experiment of simulation of non structural damage in a doll's house spring model . Made by Flipagram	non-strucural damage prevention	
	Samu	Terremoto ad Amatrice	ITA		Animated presentation of the check list of the school with related advice to mitigate risk. Made by Prezi	non-strucural damage prevention	available at https://prezi.com/rs1qqeyo-bbk/untitled-prezi/

School year 2016-2017: Scientific and Classic Lyceum "Parentuccelli-Arzelà", Sarzana (La Spezia - Northern Italy Pilot Area)

Class	Authors	Title	Lang	File type	Product	topic	Fname
1 A	All students	KnowRisk ITA-USA	ITA	ppt	A compare beetween check list at school in Italy and in Kentucky, with photos, drawings, comic strip	non-strucural damage prevention	
1 B	All students	Progetto KnowRisk	ITA	mp4	movies and backstage with students acting and comment about safety	non-strucural damage prevention	
1 C	Betti, Fattorelli & Peoni	Progetto Terremoto	ITA	pdf	song	safety behaviours	
	Eleonora, Alice & Giulia	Danni non strutturali	ITA	avi	movies and backstage with students acting, related comments and the shake movie of students's experiment of simulation of non structural damage in a bedroom model with a mannequin.	non-strucural damage prevention	

	Silvestri & Ricci	KnowRisk	ITA	ppt	presentation of a check list with non structural elements and related photos with a mannequin. At the end the video of the experiment with picture and fisher	non-strucural damage prevention	
	Briozzo Alessandro	Come prevenire e limitare i danni non strutturali in caso di sisma	ITA	ppt	check list with non structural elements and related images	non-strucural damage prevention	
	Elisa Corsi, Elisa Del Grosso, Francesca Filattiera & Greta Alcuri		ITA	ppt	drawings and skect	safety behaviour	
	Federico Viscardi	I danni non strutturali	ITA	pdf	reflections about the importance to prevent and know the non structural elements	non-strucural damage prevention	
	Shakira Jouhari, Martina Meoni, Sara Taormina & Chiara Franchini	I terremoti	ITA	mp4	Flipagram presentation with text and images	non-strucural damage prevention	
	India Manera, Rebecca Drabczyk & Letizia Carli	La scuola è sicura?	ITA	ppt	presentation of a check list with non structural elements and related photos and information from the responsible of security at school	non-strucural damage prevention	
	Luca Scamardella		ITA	pdf	text and image of a shaking model	non-strucural damage prevention and safety rules	
	Secchi & Tassoni		ITA	mpg	video of different shaking model (one for every room type	non-strucural damage prevention	
1 E	Matteo Stefani	Progetto KnowRisk: d	ITA	ppt	presentation of a check list of non structural elements and related photos	non-strucural damage prevention	
	Calistri, Bifani, Scerra & Molinari		ITA	doc	text and photos to describe the safety rules and check list of the gym of the Lyceum	non-strucural damage prevention	

	Jouharf, Tacchini, Rossi, Meta & Esposito		ITA	rtf	text and images	what is an earthquake	
	Bertolucci, Limongi, Castagna & Ricci	Teremoto Io Non Rischio	ITA	mp4	animated presentation with text and photos	what is non structural damage and its prevention	
	Alessia Caliani, Kathy Tonelli, Virginia Baccellieri & Giulia Cadopardo	Terremoto	ITA	png	comic strips	what is non structural damage and its prevention and safety behaviour	
1 S	Sacchelli, Pellistri, Albanesi & Vento		ITA	ppt	text and images	safety behaviour	

School year 2015-2016: I.C. "G. Monteggia", Laveno Mombello (Northern Italy Pilot Area)

Class	Authors	Title	Lang	File type	Product	topic	Fname
3 A	Elisa Cinquemani & Lara Scapolo	In case of Earthquake	ITA	mp4	presentation of a hand drawn and written printed poster	behaviour in different situations	ELISA CINQUEMANI
	Cecilia Bevilaqua & Giorgia	Earthquakes	ITA	ppt	presentation of their a hand drawn and written printed book	what's an earthquake, prediction and prevention, behaviour in different situations	CECILIA BEVILACQUA
	Gioele Gregorini & Gallo Christian	Earthquakes	ITA	mp4	animated presentation	behaviour in different situations	GIOELE GREGORINI
	Beatrice Sella	Earthquakes: what to do?	ITA	wmw	animated cartoon	behaviour in different situations	BEATRICE SELLA
	Sara Gaballo, Gomiero Giorgia Martelotta Alessia	A Volcano in Laveno	ITA	mp4	movies with students acting	erupting volcano	SARA GABALLO
		The S. Andreas Fault	ITA	doc	text and immages	seismology	
	Gaja Cisterino	If you are in-door...	ITA	doc	text	behaviour indoor	GAJA CISTERNINO
	Eleonora de Antoni	Pay attention to the shaking	ITA	ppt and mp4	movies with students acting	behaviour in different situations	ELEONORA DE ANTONI
3 C	Cavuoti Lorenzo, Guza Krissel & Sangklay Christian	Earthquake	ITA	ppt	poem and ppt presentation (text and immages)	safety behaviours, damage	Know risk Kr Lo Ch.pptx
	Guza Jennifer, Elisa Mezzadri, Emanuele Fadda	non-strucural damage caused by earthquakes	ITA	ppt	ppt presentation, damage immages	non-strucural damage	danni non strutturali Je Em EIM
	Francesca Bertelli, Alessia de Marchi, Miriam Ubaldi	Earthquake	ITA	ppt	ppt presentation, text, immages and interview	preparedness	IL TERREMOTO Mi
		Earthquake kit	ITA	ppt	ppt presentation: description of usefulness on the emergency kit	preparedness	kit terremoto Ma
		10 safety rules	ITA	ppt	pp presentation: text and immages	preparedness	Regole per salvarsi da un terremoto Lo Ma Id
	Arianna Bonazzi, Elisa Russillo, Spertini Caterina	Earthquake	ITA	mp4	video, text and images and a shake movie	non-structural elements, prevention, safety behaviours	video terremoti Ar Cat EIR

	Riccardo, Betrice Allera, Marta	Interviews on earthquakes, volcanoes and plate tectonics	ITA	avi, mov	video with interviews to laypeople and ducks	what the people know about earthquakes, prevention and safety	introduzione, interviste