2016

"Monitoring and Evaluation of Natural Hazard Preparedness at School Environment"

Newsletter #5

Field trials: Protection against earthquake hazard in the school environment

Humanitarian Aid and Civil Protection

Project co-funded under the Union Civil Protection Mechanism, Grant Agreement No. ECHO/SUB/2014/698447

CONTENTS

1. Introduction

The present newsletter aims to provide information on the organization and performance of the trials relevant to the earthquake scenario. Specifically, three earthquake field trials took place in educational premises and local schools in Greece (EPPO, UoC-NHMC) and Romania (INCD). These field trials involved the monitoring and evaluation of the E-PreS system during the evacuation process in building facilities. In order to perform the respective trials, the deployment and configuration of E-PreS infrastructure/system in schools and other educational environments were necessary. More specifically, floor mounted sensors (RFID readers) were placed in the indoor facilities allowing the people counting as they pass through the checkpoints during the trials. Moreover, the participants carried lightweight wearable sensors (RFID tags) that allowed for constant, almost not perceivable, interaction between the user and the system. Additionally, during the preparation phase the respective partner (EPPO, UoC-NHMC, INCD) prepared all printed and accompanied material (e.g., guidelines and evaluation sheets) that has been used during the drill.

2. Preparation of the field trials

2.1. E-PreS web platform at Educational Environment: General Aspects

The E-Pres web platform allows the user to:

- insert a new building plan along with all related information (e.g., number of floors, number of students in each floor, mustering stations),
- upload floor blueprints in a variety of forms (e.g., pdf, jpeg),
- insert checkpoints with associated metrics (e.g., maximum flux),

- define acceptable evacuation metrics (e.g., maximum evacuation time, number of students that did not follow the recommended evacuation path, order of class evacuation),
- fill out questionnaires regarding the building, student and staff preparedness level,
- fill out questionnaires regarding the execution of the evacuation drill.

Following a well-established solution, the user will interact with the E-PreS system by means of a web application, thus enabling both local and remote drill observation, result acquisition and decision making. The web application is accompanied by a strong authentication system ensuring the authorized access to potentially sensitive data of current and past drills. It consists of the following components:

- Drill Registration/Modification.
- Drill Review.
- Real Time Monitoring.

2.2. E-PreS web platform at Educational Environment: Testing and Evaluation

EPPO, NHMC and INCD got feedback from the users of the E-PreS web platform by a) tabletop exercises and b) questionnaires.

a) Tabletop Exercises

Tabletop exercises were implemented at EPPO's, NHMC's and INCD's premises, in order to check the functionality, usability and friendliness of E-PreS web platform. The testing of E-PreS web platform through tabletop exercises aimed to:

- evaluate the E-PreS Web Platform;
- identify weaknesses and determine how it can be improved to become more realistic and complete;
- obtain participant feedback and recommendations for web platform improvement;
- increase awareness and understanding of hazards and their potential impacts;
- adopt E-PreS platform in the emergency plan procedure according to school preparedness needs.

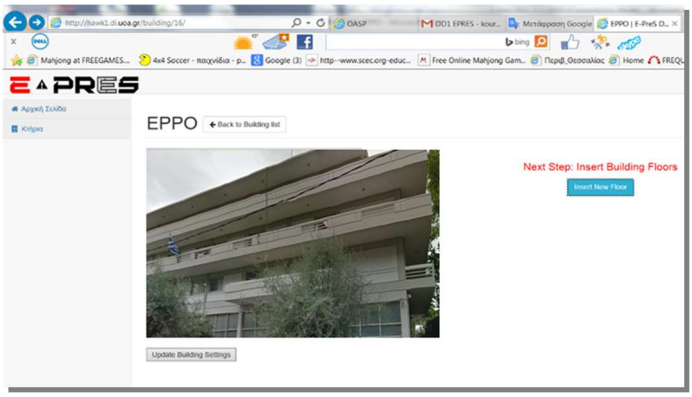
The duration of tabletop exercises depended on the audience, the topic being exercised and the exercise objectives. In our case the tabletop exercises were conducted in a few hours, so it was a cost-effective tool to validate the E-PreS web platform.

b) b) Questionnaires

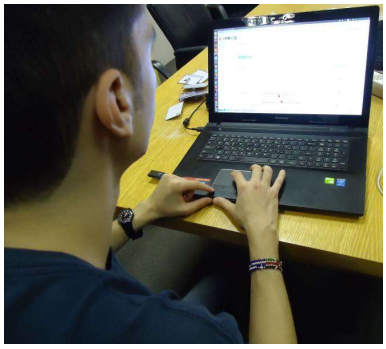
Right after tabletop exercises, Questionnaire A was filled by EPPO's, NHMC's and INCD's staff that participated to these exercises, in order to detect participants' perception about the various principals' features of E-PreS web platform, such as: usefulness, ease of use, ease of learning etc.

Additionally, during the preparation of school drills, School Principals, teachers involved with school emergency planning and drill evaluators had the opportunity to test the E-PreS web platform and filled the following Questionnaire A as well.

2.2.1. Testing and Evaluation in Greece: EPPO Earthquake Tabletop Exercises



E-PreS web platform



Tabletop exercise at EPPO premises

Test at EPPO premises

Two tabletop exercises were held at 28th June and 9th August 2016. Prior the tabletop exercises, the equipment (checkpoints, repeaters, laptop) was installed and an example of drill using the E-PreS platform was presented by UoA team.

The UOA and EPPO staff discussed about:

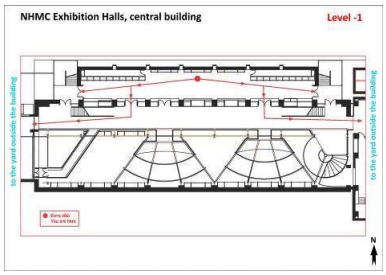
- a simulated emergency situation using the E-PreS web platform,
- corrections and improvements of the structure and layout of E-PreS web platform, in order to be clear and friendly, easy to use, easy to learn etc.
- the improved interface of E-PreS web platform and new ideas,
- the noticed gaps and vulnerabilities concerning the adaptability of E-PreS web platform by the school emergency management procedure,
- the effective implementation of field trials using E-PreS System, and
- various solutions concerning the wearable tags that provide wireless monitoring and tracking of students.

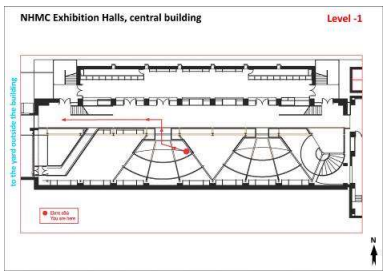
Finally, EPPO team decided to:

- insert the RFID tags into corresponding card holder (sold separately), and the students should wear them horizontally (landscape format) near to their shoes, and
- hold a small scale exercise at EPPO promises in order to test the E-PreS system in real situation.

2.2.2. Testing and Evaluation in Greece: NHMC Earthquake Tabletop Exercise NHMC

NHMC main Exhibition Halls





NHMC emergency plans for the main Exhibition Halls at level -1

Assembling and Testing of E-PreS equipment at the NHMC facilities

The NHMC staff working for the E-Pres project started soon after the Bucharest meeting to test the acquired equipment. During September and October, the various items of equipment were assembled together, moved at the NHMC exhibition halls and started the testing activities. These had to do with the operation of the equipment, the collaboration and connection of the various items, its interference with the building architecture and structure, the existing wifi networks and the design of effective evacuation scenarios.

Testing drills were implemented in various cases and occasions using the NHMC staff, as well as visitors. The main problems that have been faced were related with the development of a correct and most effective scenario within the rooms and the facilities of the museum, the communication of check points with the E-Pres wifi network, the connection of power banks, raspberries and extenders with the networks, and the proper use of the tags.

During all these stages there was collaboration and discussion with the UoA Epres staff, which also visited NHMC to test *in situ* the equipment and standardize the procedure. The real drills were then scheduled for the November and December with school classes that visited the NHMC.

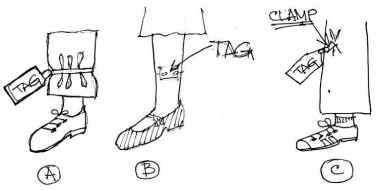
The initial drill scenario referred to a damaging earthquake that had happened about 100 miles offshore north to the town of Heraklion. Seismological Institutions announced a magnitude of about 7 Richter scale and earthquake duration of about 15 minutes. However, following the testing phase, some readjustments and revisions were made.

Museum staff under the guidance of the UoA assembled and installed the necessary equipment and started testing the system at both the laboratories of NHMC in the University of Crete and the Exhibition Halls. A final check of equipment and a desktop drill was performed with the presence of UoA staff in September. Several desktop drills were performed in September and October, simultaneously with the dissemination and school information on the system. After standardizing the system and the evacuation plans for the various facilities of the Museum the first drills with participation of museum visitors were scheduled for November.

2.2.3. Testing and Evaluation in Romania: INCD Earthquake Tabletop Exercise

Test deployment at INCD premises: checkpoints and repeaters placed on the corridor

Checkpoint components – mounted and powered up in the laboratory room



Various solutions for RFID tags fastening (INCD)

RFID tag holder

The tabletop exercise followed a period of intense activity of deployment and testing the E-PreS platform at INCD premises, in order to identify any potential issue that could occur during the actual evacuation drills. The members of the INCD project team and other local staff participated to these tests and some of them provided help and suggestions on practical installation aspects. UoA team provided continuous support during this period, through e-mail and teleconferencing.

The tabletop exercise was held in the Laboratory "National Seismic Network, Seismic Risk Assessment and Actions on Buildings" (RNERC), to which the INCD team belongs.

Prior to the tabletop exercise, the equipment (checkpoints, repeaters, laptop) was installed at INCD premises in a configuration as close as possible to the configuration required by the pilot exercise scheduled to be performed at School No. 77 Pantelimon.

The tabletop exercise began with a short recapitulation of the performed tests and encountered issues, as well as with the proposed workarounds. The E-PreS system was powered up and a short demonstration was performed, highlighting the main steps of a drill.

One of the issues concerned finding a robust and easy solution for wearing RFID tags. As these were delivered as rolls (see below figure), they had to be cut apart and a system for attaching them to drill participants had to be found. These solutions were supposed to provide a quick and easy attachment, sufficient stiffness to protect the tags against bending and tearing, and, on the other part, minimum inconvenience for drill participants wearing them. Several solutions were proposed, during previous discussions, by the members of the INCD team, by the UoA staff and by the members of the other participating teams. The various discussed solutions are shown in the sketch on the left (INCD).

Finally, the decision to use transparent badge holders was taken, possibly with an additional piece of cardboard inside, in order to increase the stiffness (solution "C" in the sketch). Badge holders will be attached by clips to participants' clothes, socks or shoes. It should be noted that, according to the UoA specifications, RFID tags should be attached close to the ankle, to avoid signal attenuation by participants' bodies.

Another discussed issue was finding the optimal layout of repeaters and checkpoints, in order to ensure signal stability and

INCD staff during the tabletop exercise

coherency with evacuation paths. This was achieved by a trial and error process, as well as based on the indications provided by UoA project team.

During the tabletop exercise, the description of School No. 77, as implemented in the platform, was used. This description included the layouts, as well the position of the checkpoints along the evacuation paths.

The tags were initialized a drill simulation was performed, using the installed nodes. Various options provided by the platform were analyzed and discussed.

Finally, a test of database synchronization was performed, by using the results of the simulated drill. These results were sent to the UoA server, by using the specific options provided by the E-PreS platform.

3. Implementation of Drills using E-PreS System

3.1. Earthquake Drill Procedure

The earthquake drill procedure includes the following steps:

During the Earthquake
Each drill begins with a characteristic acoustic signal. When earthquake shaking begins, it is time for students and staff to immediately apply what they have learned about "What to Do during an Earthquake" (Drop, Cover, Hold on). Reacting promptly and safely reduces the chances of being injured.
More specifically, if they are inside the school building, they should:

- *Stay where they are until the shaking stops. They should not run outside.*
- *Drop to the ground, Cover under the desk and Hold on until the shaking stops. They should ensure that their whole body is covered.*
- *Stay where they are until the shaking stops.*

After the Earthquake
Once the shaking stops, schools should be prepared to implement prearranged, earthquake-specific emergency response and recovery plans. Students and staff must keep in mind that aftershocks may strike at any time; exacerbating hazards created by earlier shaking and requiring that everyone again drop, cover, and hold on.
When the shaking stops, evacuation procedure involves the following steps:

- *teacher gives the order to evacuate the classroom*
- *students leave their classrooms and evacuate immediately the school building according to the emergency school plan*
- *students move carefully away from the building facades towards the predefined open, safe place.*
- *teachers check their students to ensure that all children have evacuated the building."*

3.2. Earthquake Drills

In the framework of E-PreS project three drills (two in Greece and one in Romania) have been held. A few days before the drills, training courses addressed to School Principals, teachers responsible for school emergency planning and evaluators have been implemented in order to understand and learn to use the E-PreS System.

Greek schools and other educational structures according to the relevant legislation are required to have earthquake preparedness plans in place. A legal requirement of all Greek schools is at least three emergency drills; one at the beginning of each school year and two more trials during the school year. Drills should be carried out "in accordance with the school's evacuation plan".

In Romania, according to the "Protocol on training in emergency situations of children, pupils and students in national higher education institutions and universities" issued by the Ministry of Internal Affairs and the Ministry of National Education, No. 62170/9647/2013, drills / exercises for different emergency/disaster situations, including earthquakes, shall be performed at least two times per semester.

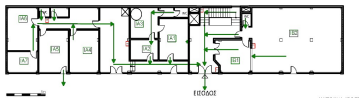
3.3 Evaluation of Earthquake Drill Procedure using E-PreS System

The evaluation of the drill using E-PreS System is very important, so, two Questionnaires (B1 and C) have been developed by EPPO in order to evaluate the earthquake drill procedure using E-PreS System. The first one have been addressed to the teachers, the administrative school staff, etc. who participated in the drills, while the second one have been addressed to whoever was the user of E-Pres System during the drills (School Principals or the teachers responsible for the school emergency planning and the Drill Evaluators), in order to evaluate the E-PreS System.

3.3.1. Earthquake Drill in Athens

at E.P.P.O. premises

EPPO premises



Blueprints of EPPO premises (ground floor, 1st floor, 2nd floor)

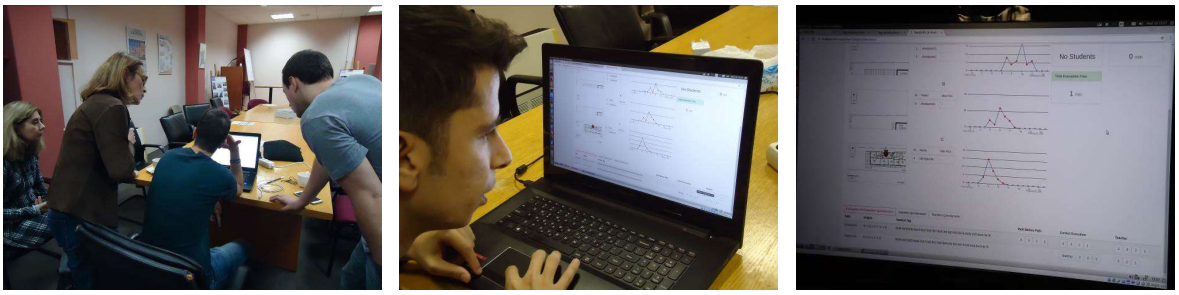
Earthquake drill scenario: it was 12:30 Thursday noon on the 10th of November 2016 when a medium earthquake occurred and was felt all over Attica region. The Athens Geodynamic Institute announced that the earthquake's magnitude was 5,3R and its 8picentre was located 20km northeast of Athens.

Checkpoint nodes were placed at EPPO building

In order to perform the respective drill, sensors (RFID readers) were placed in the stairs of 1nd and 2st floor and the exit of the building allowing the localization, and observation of speed and flow density of staff participated in the experiment.

The participants were carrying lightweight wearable sensors (RFID tags) attached at their shoes allowing constant interaction between the user and the system. Before the drill performance the participants were informed about the start signal of the drill and the evacuation routes according to the building's emergency plan.

RFID tags used by EPPO



Earthquake Drill at EPPO premises using the E-PreS System

After the drill UoA and EPPO teams discussed about the recording results and decided that:

- The cables of the checkpoints at the exits and stairways might be a problem for the evacuees. They must be well secured on the floor to avoid falling accidents.
- The checkpoints at the exits and the staircases should be placed in such a way to avoid narrowing the evacuation path.
- The tag holders should be secured in the clothes to prevent tags from falling during evacuation.
- The antennas are very sensitive, so attention should pay in their placement, in order to avoid records "noise".

3.3.1. *Earthquake Drill in Athens*
at Navy Petty Officers Academy

The exercise took place at the Hellenic Navy Petty Officers Academy on the 22nd of November 2016. The Academy is situated in southwest area of Attica region, at Skaramangas' Naval Base.

In the 1500 acres of the Naval Base premises, the following buildings are located: the Hellenic Navy Petty Officers Academy which accommodates approximately 500 students, crucial storage facilities, costal navy facilities, a complex of 30 costal summer residences and a large parking area (capacity of 1200 vehicles).

The location of the Navy Petty Officers Academy at Skaramangas area

The location of exits (1& 2) of the Academy building and the corresponding assembly areas

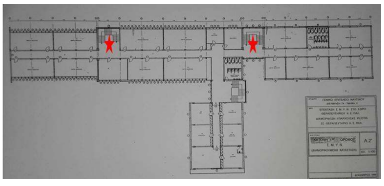
East side of the Academy building

Earthquake drill scenario: it was 13:30 Tuesday noon on the 22nd November 2016 when a strong earthquake is felt allover Attica region. At 13:32, the Athens Geodynamic Institute announced that the earthquake's magnitude was 6,1R and its epicenter was located 20km southwest of Athens.

The students of Hellenic Navy Petty Officers Academy and all the citizens of the affected area evacuated the buildings right after the shaking stopped.

Blueprint of the ground floor of the Academy. The main entrance of the building and the exit are marked

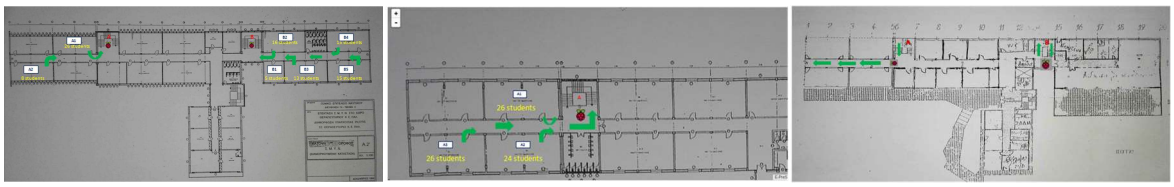
The building of the Academy consists of 2 floors, ground floor and basement. The building is surrounded by open spaces where students of the Academy do the outdoor activities. The Academy building has two evacuation exits; one at the ground floor (exit 1) and one at the basement (exit 2). Each of these exits leads directly to corresponding open spaces where the students gather. These open spaces are also used as assembly areas in emergency situations. Layouts of the ground floor the first and second story of the Academy, where the drill was performed, are shown on the left.



Blueprint of the first floor of the Academy (stairs are marked with red)

Installation of checkpoints at stairs and floors

In total 174 students participated in the drill. All students were in their classrooms at the beginning of the drill. In total 10 classes were active at that time and participated in the simulation, 7 on the first floor and the other 3 on the second.



Evacuation plans of the first (left), the second (middle) and the ground (right) floor of Naval Academy, showing evacuation paths (green arrows), stairs checkpoint locations, class evacuation order (in white squares), exits and number of students for each class.

It is worth mentioned that students were advised to walk and not run during the evacuation. This recommendation was considered of major importance since students of military Academies usually run in their routine daily activities.

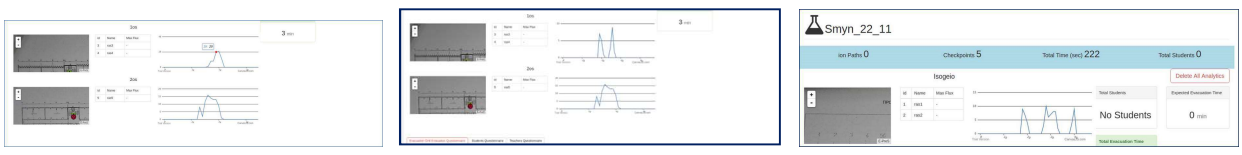
The drill began with the predefined earthquake signal. During the signal, students practiced “drop, cover and hold”. As soon as the signal stopped the evacuation started.

All students evacuated the building through the predefined evacuation routes (corridors, stairs) according to the building’s emergency plan. From the ground floor exit passed 110 students and from the basement exit 64 students.

After the evacuation students gathered at the predefined assembly areas in accordance to the exits they used

The observation of speed and flow density of students participated in the drill revealed a total evacuation time of 3min, in which 174 persons passed the 5 checkpoints and all reached the exits.

Earthquake Drill at Naval Academy



Drill results from the 5 nodes (checking points) installed

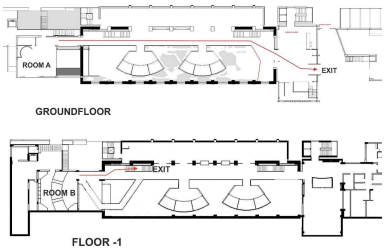
Main conclusions and comments

- The maximum flux at the basement exit reached the number of 40 persons/5 sec which definitely consists an overload. This happened due to mainly three reasons: a) all five classrooms of the first floor evacuated simultaneously and not one by one resulting overcrowding to the stairs and basement exit. The evacuation guidelines clearly specify that the evacuation procedure should be gradually unfold starting by the classes closer to the exit (or the staircases) to avoid crowding b)the door of the basement exit was not wide open to accommodate the number of evacuating students and c)the basement exit was not completely unobstructed and clear due to a garbage can narrowed the width of the exit.
- The cables of the checkpoints at the exits and stairways might be a problem for the evacuees. They must be well secured on the floor to avoid falling accidents.

The moving rhythm of the evacuation was rather fast. Students didn't have a normal pace during the evacuation procedure but a running pace instead. This was also revealed by the evacuation time which was calculated to 3 minutes. It must be noted that after an earthquake the evacuation must be done with normal pace to secure safety and avoid accidents.

3.3.2. Earthquake Drill in Herakleio

At the NHMC Exhibition Halls



NHMC emergency plans at level 0 and -1 used for the drills

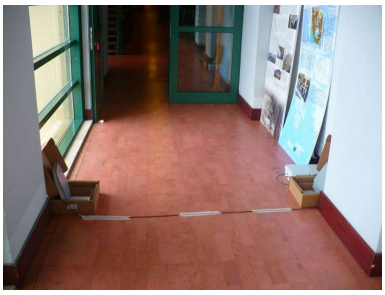
Three drills were executed on the 22 th, 25th and 30th of November. In these drills classes from schools that were visiting the Museum participated implementing the already prepared scenario for an earthquake event.

We used the two rooms for the NHMC-CET (Centre of Education and Training) to implement the drills on the 22th, 25th and one additional floor at the -2 level for the drill of the 30th. Children were supposed to participate in training activities in these places when the earthquake happened.

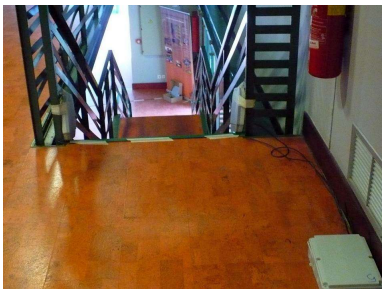
The evacuation plan was already known by the teachers and the NHMC staff that was supporting the classes. The teachers and pupils were informed in advance for the drill execution and the evacuation plan, as well as for the purposes of the drill.

Emplacement of the tags

Before each drill we tested the connection of antennas with the E-Pres wifi network, checked that antennas were capturing the tags and the system was operating well. Pupils and teachers had to wear at their shoes the necessary tags, to be traced by the system.



Room A exit check point



Stairs check points






Images from drill executions

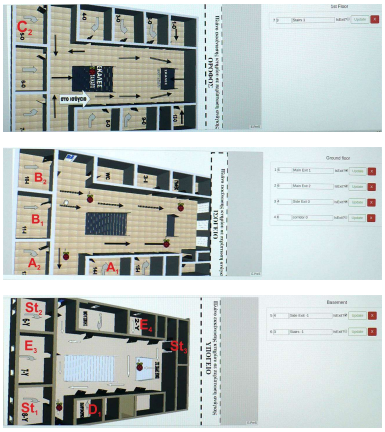
3.3.2. Earthquake Drill in Herakleio

At the 20 and 56 Primary Schools

The drill was implemented on 21th December 2016 at the 20th and 56th Primary schools that are hosted in the same building. The building hosts 21 classrooms with 448 pupils in total.

The building of the 20th and 56th schools

Aerial view of the 20th and 56th schools

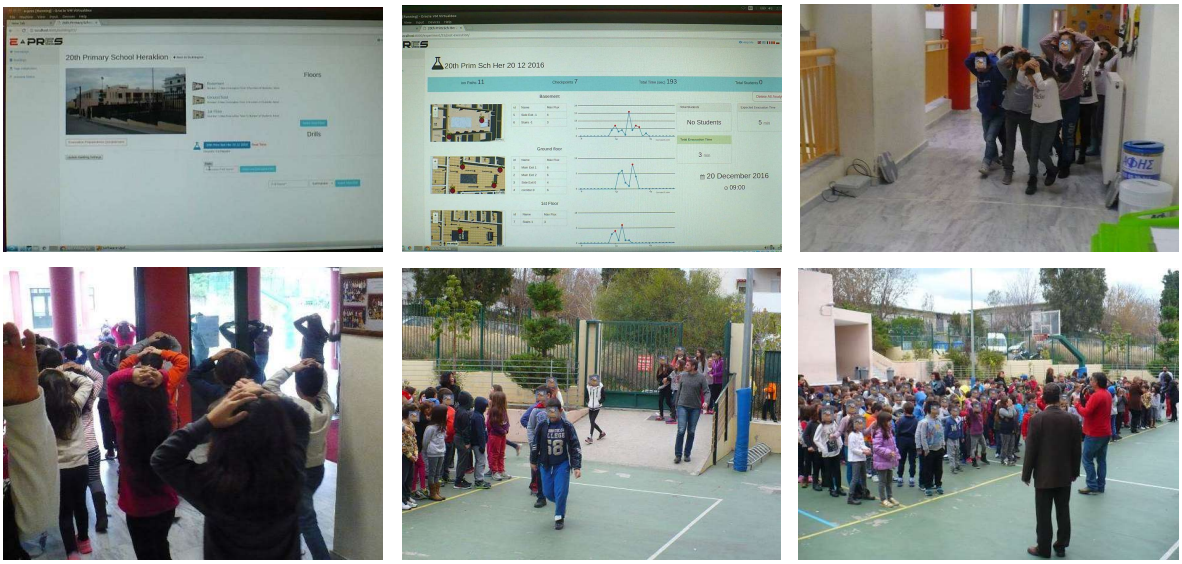


The E-preS drill plan for the 20th and 56th schools

The system was set in place and tested in the afternoon of the 20th of December by the NHMC staff, the school directors and evacuation officer. We decided to test **11 classrooms** that were located at the three floors of the school. Six were based on the basement level, four at the ground floor and one at the first floor. The building had three emergency exits, one in each floor. The main were though at the ground floor, which was the largest and served the main needs for evacuation of the school. Two classrooms from the basement floor, three from the ground floor and the one from the first floor that would participate in the E-pres drill had to use the main exit. One from the ground floor had to use the side exit, and four from the basement floor the side exit of that level. In total **238** pupils and eleven teachers were engaged in the drill.

The drill scenario was based on the school evacuation plan. School uses as emergency exits three doors: the main one, which is the largest and occurs at the ground floor, and two side doors, existing at Ground floor and Basement level.

All school has to meet at the assembly point which is located at the school yard.



Drill execution at the 20th and the 56th school

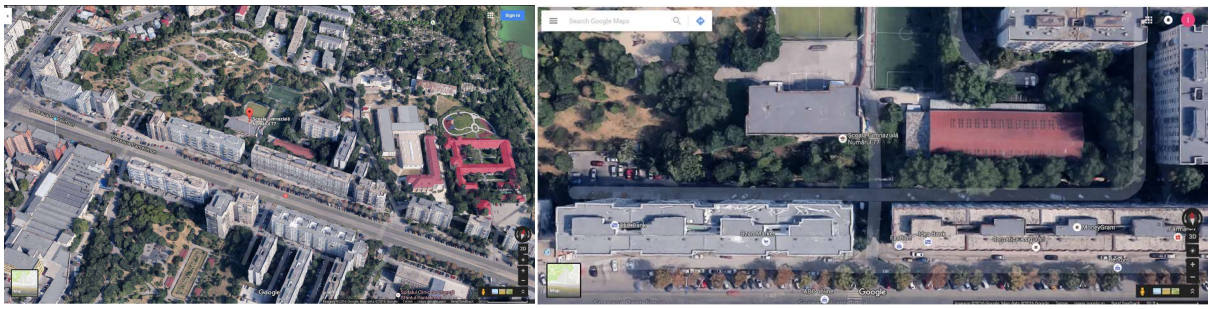
The E-pres system corresponded **perfectly** and **recorded the whole evacuation drill**. The drill was executed in accordance to the existing evacuation plan and in less time than initially foreseen. Each classroom's route was monitored all over the drill, the pupils' and teachers' correspondence was traced through the selected check points and the evacuation time for each classroom was estimated. The contribution of E-pres system helped to **evaluate the whole evacuation plan**, to point out areas of pupils' **crowding**, to **identify routes** that could serve evacuation needs for more classrooms than those scheduled in the plan and to **better manage** the evacuation time.

Overview and Evaluation of E-PreS System at Natural History Museum Drill

The process of testing and implementing E-preS system at the NHMC was a long and hard process. Although the building was suitable enough to create and communicate without problems, the E-Pres Wi-Fi network, the long corridors, the existing local Wi-Fi, which was interfering initially with E-pres, and the long distances between the check points, induced several operational problems, which appeared during the pilot testing phase and also during school drills. All this process helped to improve system effectiveness and operability by adding an external router to create E-preS Wi-Fi, overpassing software problems and making finally the E-preS system more robust and stable. The final implementation at the 20th and 56th primary schools of Heraklion, at a building more complicated than the museum, was very ease, without operational or functional problems and with impressing results.

3.3.3. Earthquake Drill in Bucharest

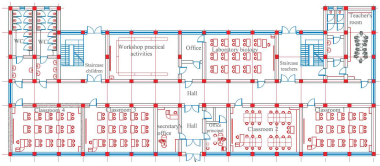
The exercise took place at School No. 77 in Bucharest on November 24, 2016, 14:30 hours. This school is located in the Pantelimon district of the city (see map). This district, which has as main axis Pantelimon Boulevard, an important radial artery of Bucharest, is characterized by a large number of mid-rise and high-rise reinforced concrete multi-apartment buildings, erected in the 1970's to accommodate factory workers. Some of these buildings suffered moderate damage from the catastrophic 7.2-magnitude earthquake of March 4, 1977, and were retrofitted in the years that followed. Memories about earthquake damage are still persistent in the population.



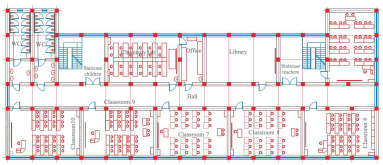
Google Earth view of the surroundings of School No. 77

Main entrance (1) of School No. 77

The school building has a standardized design, of the type used in the 1970's all over the country. Its location is right behind the blocks on the Pantelimon Boulevard. The school has a large backyard, where students gather for different activities, and which is easy to access from each of the school exits. This backyard was chosen as a gathering place for the drill. However, other open spaces, as a park and some nearby sports grounds, could be used for the same purpose.



School No. 77: ground floor layout



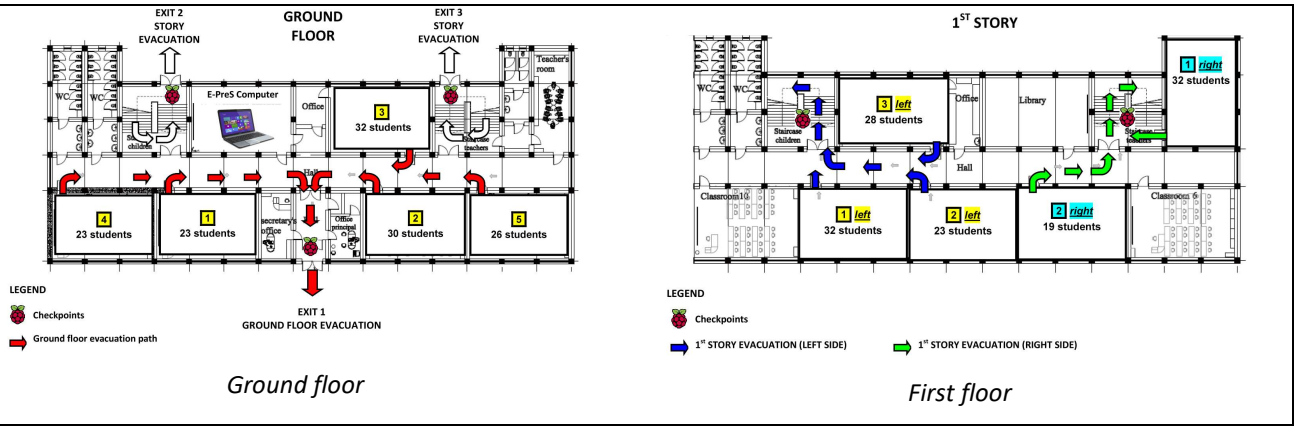
School No. 77: first floor layout

The school has a symmetric layout, which allows for simple evacuation paths. At the ground floor, there are three entrances: the main entrance (1), facing to the Pantelimon Boulevard, and two secondary entrances (2 and 3), facing to the sports grounds and the park. The school has a large backyard, where students gather for various activities, and which is easy to access from each of the school exits. This backyard was chosen as a muster point for the drill. However, other open spaces, as a park and some nearby sports grounds, could be used for the same purpose.

Layouts of the ground floor and first story of School No. 77, where the drill was performed, are shown on the left.

Earthquake drill scenario: it was at 14:30 hours when a strong earthquake (M=7.2) occurred in the seismogenic Vrancea area. This area, located at about 160 km from Bucharest, generates subcrustal earthquakes at hipocentral depths between 70 and 200 km and has caused several catastrophic seismic events in the past.

The pupils, teachers and other school staff evacuated the school building after the shaking stopped, following the instructions and regulations for emergency drill execution.

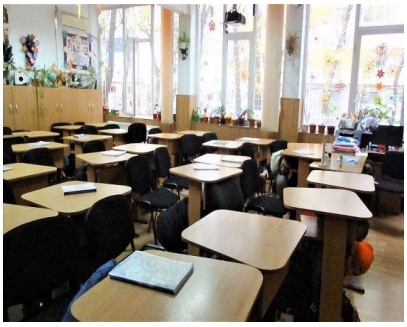


School No. 77 evacuation paths (red, blue and green arrows), checkpoint locations, class evacuation order and number of students for each class

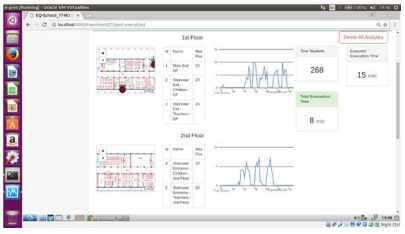
The number of students was 268 (134 at the ground floor classes and 134 at the first story). Students were from the V-VIII grades, i.e. 11 to 14 years old.

Students were already instructed by teachers on the content of the drill and were waiting in the classrooms under teachers' supervision, all wearing their tags. (It should be mentioned that emergency evacuation and drills were previously practiced in this school according to Romanian regulations in the field).

The drill began with the earthquake signal. During the signal, all students practiced “drop, cover and hold”. When the earthquake signal ended, students waited in the classrooms the signal for the evacuation of each class, according to the previously established evacuation plan.





Drill execution

Drill results

Some conclusions and comments about drill execution are presented in the following.

- The evacuation times estimated initially for drill execution (evacuation path, floor, building) were larger than those actually recorded. This was achieved not by teachers hurrying up the students (the pace was normal), but due to a better coordination than thought. Here, the previous experience of the school staff in previous emergency evacuation drills (as required by the Romanian regulations in the field) played an important role.
- The type of tag holders used (i.e. conference badges with strap clips) should be secured at the open end (e.g. by a staple) in order to prevent the tag falling out during walk (this happened to some students).
- If the drill is performed during cold weather / rain / snow, a particular attention should be given to have students dressed up adequately before living the building for the muster place. Even though this aspect could add extra evacuation times, this is actually a matter of student safety.
- The placement of the checkpoint equipment at the exit doorways and on the staircases should be made such as to avoid narrowing the evacuation path and to prevent damage by accidental kicking during evacuation. Moreover, as antennas are placed on the opposite sides of the corridor, a particular attention should be given to fixing the antenna cables on the floor or on the stairs in such a way that no stumbling hazard exists.

4. Importance of Evaluation of E-PreS System through Emergency Drills

Drills are an opportunity for schools and organizations to practice what to do during emergency case, such as earthquakes, and to improve their preparedness.

- During an emergency situation, life protecting actions must be taken immediately. There will be no time to decide what to do next; everyone must already know how to react appropriately.
- School safety and educational continuity require a dynamic, continuous process initiated by management and involving teachers, students, parents etc. A School Disaster Plan is always a work-in-progress, and never a finished document.
- School Emergency Plan should include: entrances and emergency exits, visitor check-in point, emergency open safe assembly area, gas, electricity and water shut off location(s), building evacuation routes, hazardous materials locations, fire suppression equipment locations, first aid staging area, roles and duties of teachers and school staff etc.
- Emergency drills/small scale exercises are an extremely important part of School Emergency Plan because they: 1) teach students and staff how to respond to the complications of a disaster e.g. an earthquake 2) help School Principal and staff to evaluate how well all parts of the emergency plan work together, and how well the staff and students are trained 3) offer an opportunity to identify training needs, gaps and vulnerabilities, establish new reflexes, and teach through action and repetition.
- Emergency drills and exercises should be conducted regularly in schools and working places to develop the capacity of students and staff to respond to a disaster, as well as to raise the awareness of students and staff on disaster mitigation. They are intended to be part of a larger continuous cycle of planning, training, exercising, analyzing shortcomings, and identifying areas requiring improvement, as well as subsequently taking of corrective actions.

So it is obvious that the importance of integrating drills using the E-PreS System into this broader cycle of improving preparedness is crucial.