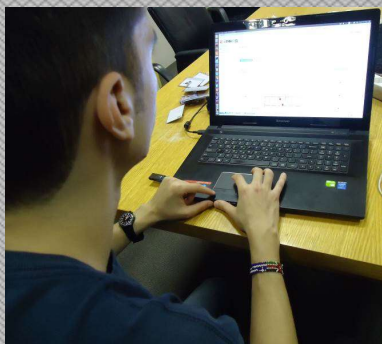


2016



“Monitoring and Evaluation of Natural Hazard Preparedness at School Environment”

Newsletter #3

Field trials: Protection against
flood hazard in the school
environment



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1. Introduction

The flood field trial took place in a local school in Bulgaria. CEI was responsible for the organization and the implementation of the trials. Specifically, this field trial involved the monitoring and evaluation of the E-PreS system during the evacuation process in the school facilities. The trial took into consideration the needs imposed by a flood. In order to perform the respective trial the deployment and configuration of E-PreS infrastructure/system in the school environments was necessary. More specifically, as mentioned above, floor-mounted sensors (RFID readers) allocated in the school facilities allowing the localization of the staff and students who participated in the trial. Moreover, the participants carried lightweight wearable sensors (RFID attached to the shoes of the participants) that allowed for constant interaction between the user and the system. Additionally, during the preparation phase CEI partner prepared all printed and accompanied material (e.g., guidelines and tutorial) that 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

CEI 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 CEI'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.

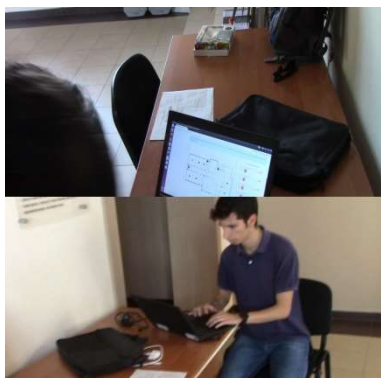
The duration of tabletop exercises depended on the audience, the topic being exercised and the exercise objectives. In our case the tabletop exercises were conducted in a few hours, so it was a cost-effective tool to validate the E-PreS web platform.

b) Questionnaires

Right after tabletop exercises, Questionnaire A was filled by CEI'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 Bulgaria: CEI Flood Tabletop Exercise



The tabletop exercise in Bulgaria was held on 31 August and 01 September 2016 in Sofia in CEI's premises and on a territory of the 171 Primary school, Novi Iskar municipality, together with UoA colleagues.

In the beginning, the UoA team presented the E-Pres web platform and familiarized our experts how to use the specific application (<http://hawk1.di.uoa.gr>). The training also included the demonstration and exercise of equipment installation-checkpoints, repeaters, and laptop. After that, UoA team presented an example of drill using the E-Pres platform.

The second part of the tabletop exercise was held in above mentioned school where we did a test how operate the equipment and how is the wireless connection between the different nodes and the platform.

The next part of tabletop exercises, conducted by CEI's team together with school representatives on 03-04 October 2016.



During the above tabletop exercises the following points have been observed:



Concerning the equipment setup: the WiFi net supported only by the repeaters was not strong enough and the connection to the nodes was weak or missing at all. Therefore, an additional powerful WiFi router had to be used, in order to achieve stable connection to all nodes/antennas from the EPRES System/Software laptop.

Concerning the effectiveness: positioning of antennas was essential. It was observed that they successfully register the passage only at a distance less than 1 m. This required shortening the distance between them which created enormous difficulties for the preservation of the technique in the real situation of evacuation of 8 -10 year old children.



The antennas were oriented in such an angle that pupils and teachers can bring the cards in pockets of their pants or coats.

After the exercise, the partner staff, headmasters, teachers and representatives of volunteers from civil protection groups, filled in Questionnaire A, created for the evaluation of the platform.

3. Implementation of Drills using E-PreS System

3.1. Flood Drill Procedure

Since 2014 the Ministry of Environment and Water of Bulgaria work on the creation of a National System for Water Management in Real Time. The pilot project consists in monitoring the river Iskar, coming from the biggest Bulgarian dam - almost 700 billion m³- and passing through Sofia Iskar River in normal conditions as well as in the event of unforeseen circumstances.

This is one of the reasons why in the Bulgarian education system there are **no developed evacuation procedures for students especially in case of flooding**. In the case of flood signal the school administration follows the procedure for standard school evacuation. In this case they need first to evacuate the students from the public buildings (e.g. schools) and then with support from the municipality to transport them to safe higher areas in the region of the town. Thanks to the real-time monitoring system, it is known in advance that we have about 2 hours for completion of the entire operation.

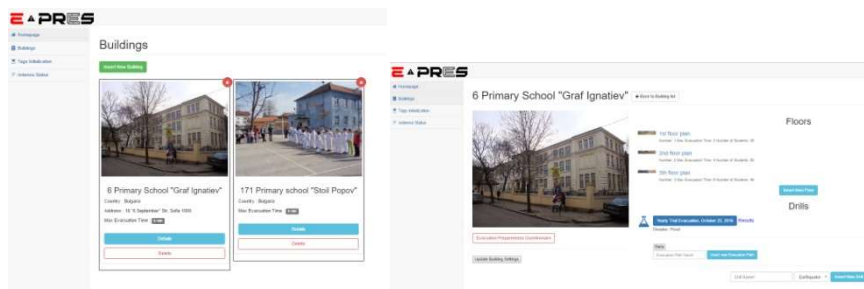
The school for carrying out the evacuation drill chosen by the CEI is located precisely at the lowest point of the Sofia field, a place in an area where repeatedly floods have occurred and the main question facing the community is not whether, but when it will happen this event again. It is therefore essential to train situations where, thanks to real-time monitoring, it is known in advance when one may occur in a state of emergency.

3.2. Flood Drill in Bulgaria

CEI have conducted experimental drills on the E-Pres project in two schools – one in Sofia Municipality and another one outside of Sofia Municipality. On 21st October 2016, the first drill took place outside Sofia in the 171st Primary School, in the town of Novi Iskar and on 25th October 2016, the second drill took place in the 6th Primary school in the city center of Sofia.

Table 1. Number of school, classes and participants in the drill exercises

Name of the school	Number of classes	Number of participants
6 th Primary School	5	115
171 st Primary School	7	168
TOTAL	12	283



First the schools' layouts were uploaded in the E-PreS platform including the all necessary details – evacuation time, plan of evacuation for each floor, evacuations path.

Both events were part of the annual planning and conducting of training evacuations in schools. It was important specifics that we had to comply our actions with their mandatory scenarios. In short – there was opportunity only for one shot. For this reason **the preparation phase was very important**. In both schools CEI's team performed preparatory activities on the day before the event. During the preparation of the school drill, CEI's staff worked together with school teachers (including the school principal) and other school staff.



The evacuation paths and the location of checkpoints were prepared according to the school architecture and the school evacuation plans.

After the corresponding evacuation signal, the students went out of their classrooms, one by one. Here it was the first problem: According the mandatory instructions, the teachers in BG lead but not follow the students. This applies especially to ages 7-11 years. Each floor has a supervisor who checks whether there remained a student in the classroom.

The second problem was that the distance between the nodes is very short and is dangerous both for the children and equipment.

At the muster point, the teachers counted students from their classes and checked that everyone reached there. The signal for re-entering the building was then issued. After returning in the classrooms students returned the tags to the teachers. These verified the tags number and state and handled them back to the CEI team.

The evacuations and all our actions were observed by representatives of the municipality and the local fire brigade.





Drill execution in Bulgaria

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, a flood, or a volcanic eruption 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.