

# ROMANIAN EDUCATIONAL SEISMIC NETWORK PROJECT

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## ABSTRACT

Romania is one of the most active seismic countries in Europe, with more than 500 earthquakes occurring every year. The seismic hazard of Romania is relatively high and thus understanding the earthquake phenomena and their effects at the earth surface represents an important step toward the education of population in earthquake affected regions of the country and aims to raise the awareness about the earthquake risk and possible mitigation actions. In this direction, the first national educational project in the field of seismology has recently started in Romania: the Romanian Educational Seismic Network (ROEDUSEIS-NET) project. It involves four partners: the National Institute for Earth Physics as coordinator, the National Institute for Research and Development in Construction, Urban Planning and Sustainable Spatial Development "URBAN – INCERC" Bucharest, the Babeş-Bolyai University (Faculty of Environmental Sciences and Engineering) and the software firm "BETA Software".

The project has many educational, scientific and social goals. The main educational objectives are: training students and teachers in the analysis and interpretation of seismological data, preparing of several comprehensive educational materials, designing and testing didactic activities using informatics and web-oriented tools. The scientific objective is to introduce into schools the use of advanced instruments and experimental methods that are usually restricted to research laboratories, with the main product being the creation of an earthquake waveform archive. Thus a large amount of such data will be used by students and teachers for educational purposes. For the social objectives, the project represents an effective instrument for informing and creating an awareness of the seismic risk, for experimentation into the efficacy of scientific communication, and for an increase in the direct involvement of schools and the general public.

A network of nine seismic stations with SEP seismometers will be installed in several schools in the most important seismic areas (Vrancea, Dobrogea), vulnerable cities (Bucharest, Ploiesti, Iasi) or high populated places (Cluj, Sibiu, Timisoara, Zalău). All the elements of the seismic station are especially designed for educational purposes and can be operated independently by the students and teachers themselves.

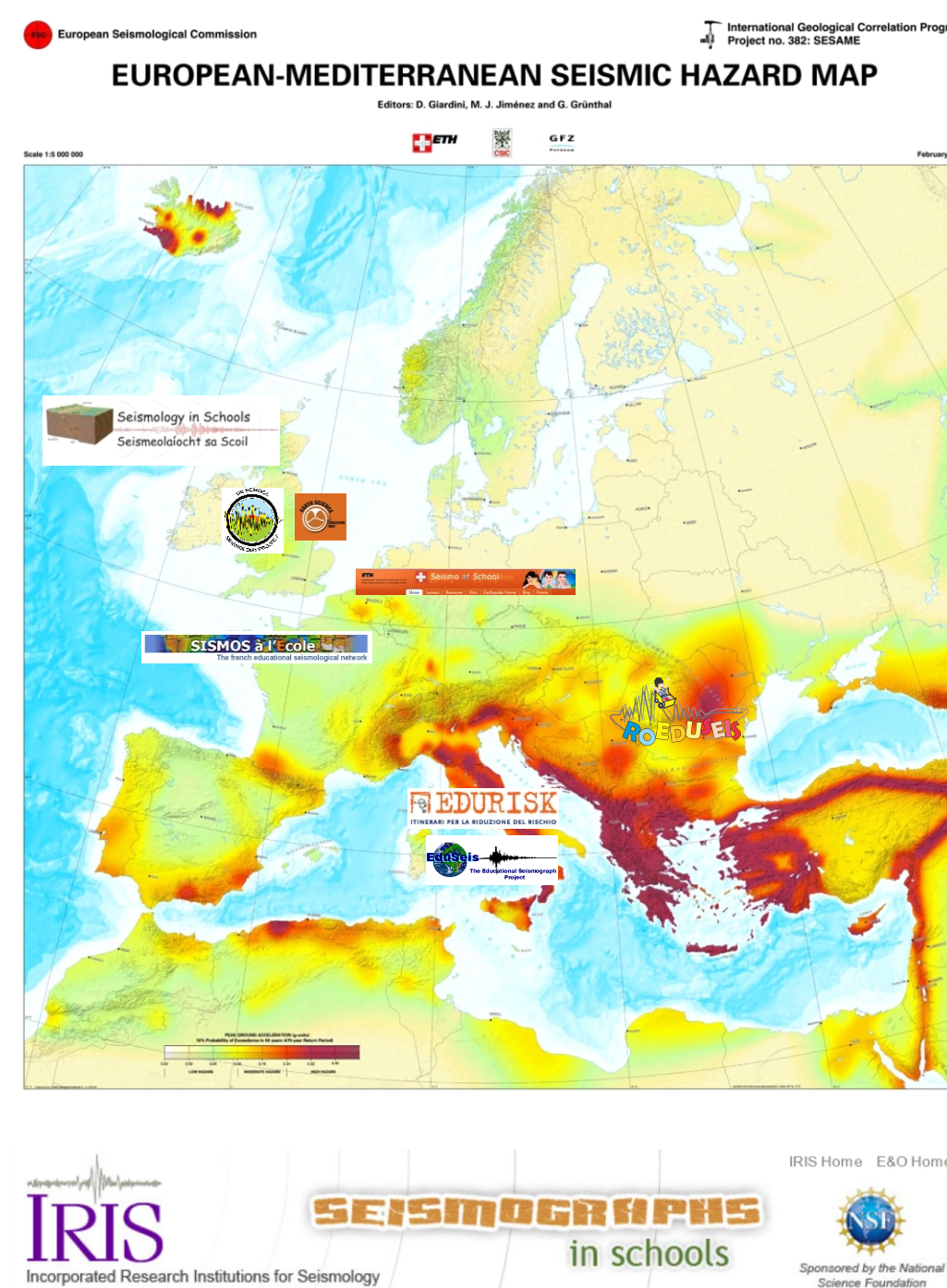
The first stage of the ROEDUSEIS project was centered on the work of achievement of educational materials for all levels of pre-university education (kindergarten, primary, secondary and high school). A study of necessity preceded the achievement of educational materials. This was done through a set of questionnaires for teachers and students sent to participating schools. Their responses formed a feedback instrument for properly materials editing. The topics covered within educational materials include: seismicity (general principles, characteristics of Romanian seismicity, historical local events), structure of the Earth, measuring of earthquakes, seismic hazard and risk.

## PREMISES

Projects all over the world.....



United States  
Educational Seismology Network



IRIS  
Seismographs  
in schools

## OBJECTIVES

### Educational Objectives

- training students and teachers in analysis and interpretation of seismological data;
- preparing of several comprehensive educational materials;
- designing and testing didactic activities using informatics and web-oriented tools;
- installing a seismograph network in schools whose data can be used in educational purposes;
- contribution to professional development and also providing the technical support for teachers involved;
- creating new learning modules in terms of school curricula and proposal of implementation in the annual educational plan;
- better training of undergraduates and master degree students regarding the importance of earthquakes in the environmental studies;

### Scientific Objectives

- main product of the project – an earthquake waveform archive with the data obtained by the devices installed in school - a large amount of such data will be used by the students and teachers for educational purposes;
- developing a seismograph network that can be integrated in the National Seismic Network
- using the obtained data to develop the integrated risk management methodologies;
- introducing the use of advanced instruments and experimental methods into schools;

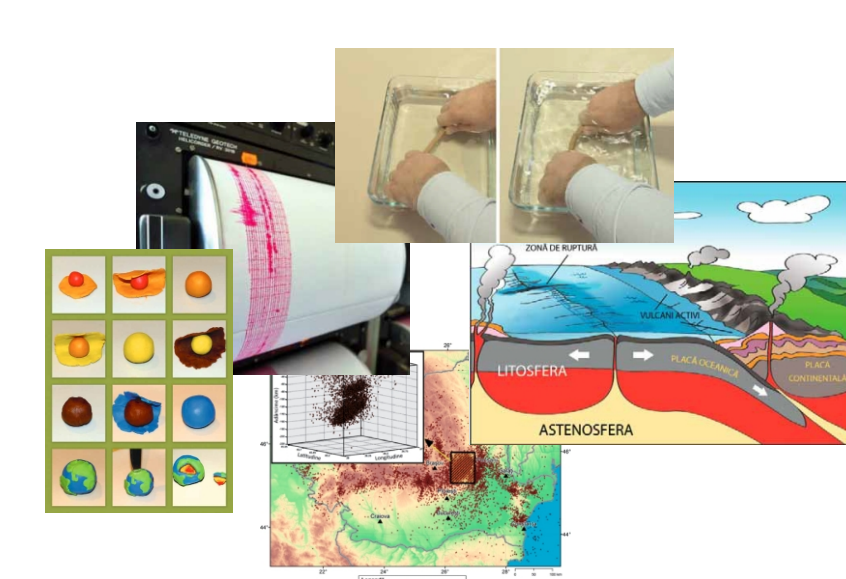
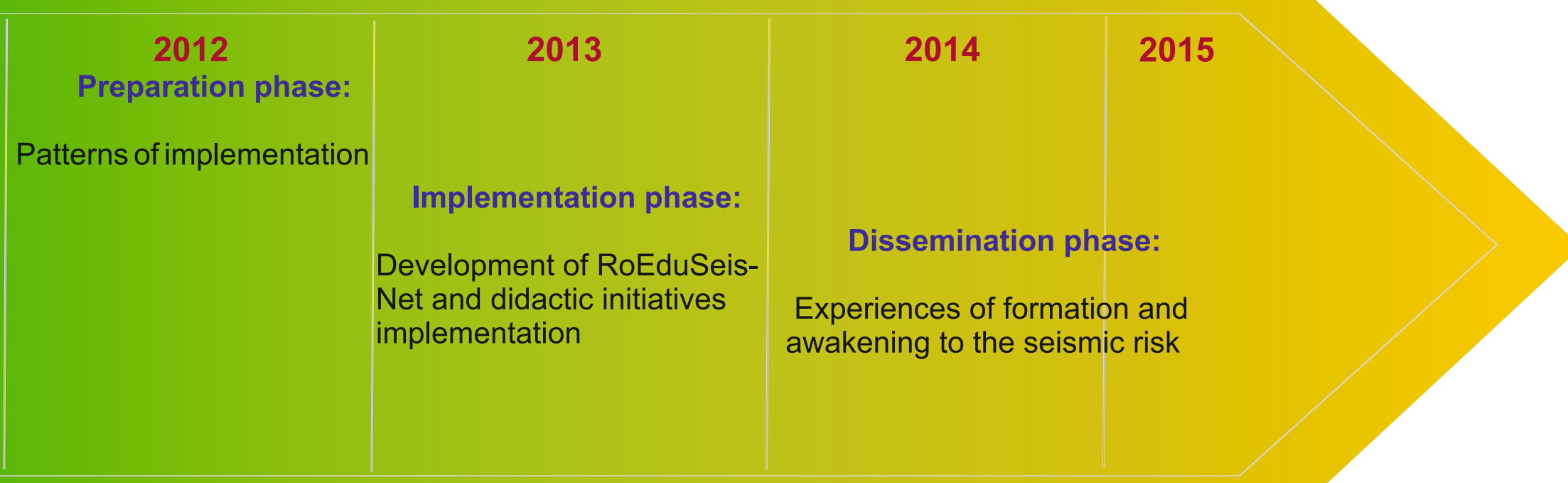
### Social Objectives

- facilitating the interaction between students, teachers and scientists; the project implies students being part of the scientific work and scientists being part of the teaching activity;
- promoting interaction at community level - improving communication between scientific institutes and community - the proposed activities can be extended to museum level through educational complementary programs; involving amatory scientific communities, local authorities and units for emergency situations in these activities;
- raising awareness of fact that earth sciences should be fields of study in elementary schools;
- improving risk prevention by informing and promoting these aspects through students and teachers;

## PROJECT PHASES

The framework is defined by **three phases**;

Each phase has specific activities that follow a logical path within a time range.



A collection entitled "Earthquakes and their effects":

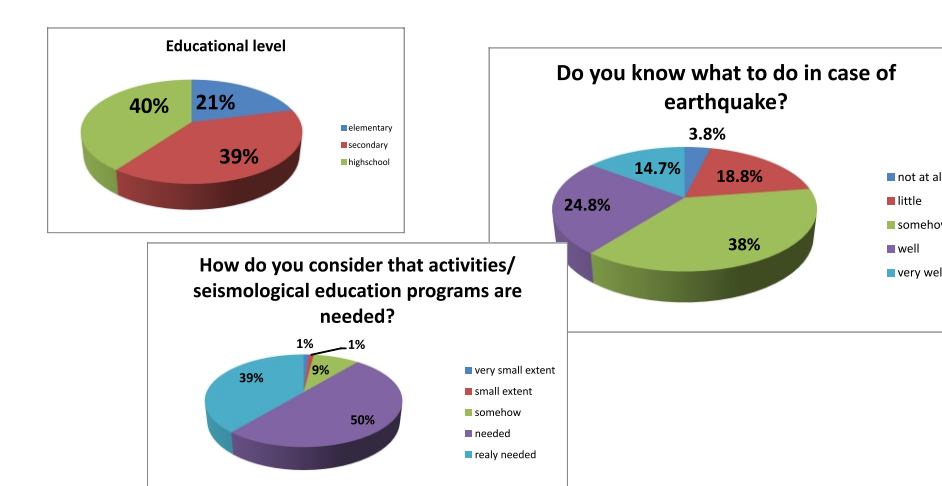
- educational materials for all pre-university education classes gather in two books (except preschool level), one for teachers and one for students
- governed by the concept "learning by doing"
- applying this concept the students will develop scientific aptitudes (measurements, direct observations, theory formulation and verification, database study)
- they will be attracted to domain as Geology, Geography, Physics, Mathematics, Informatics, etc.
- teaching modules includes laboratory exercises like earthquake location and magnitude estimation using waveforms recorded by their school seismometers, valuable information on how the earthquake affects the surrounding environment and buildings

## Developing educational resources



## Assessment/evaluation process

Determine if the learning resources and the developed materials have generated greater knowledge, improved actions and better awareness amongst the participants.



## Planning the testing ground

Project presentation developed in a workshop for teachers and schools managers in each targeted school area.

Training workshops for teachers

Online questionnaires (266 students and 75 teachers):

- 78.8% of students did not participate ever to programs/ activities on earthquakes theme and - 60% says they know somehow, little or didn't know how to behave in an earthquake case
- 90% of teachers believe that activities/ seismological educational programs are required

Regarding the practical ways of doing activities:

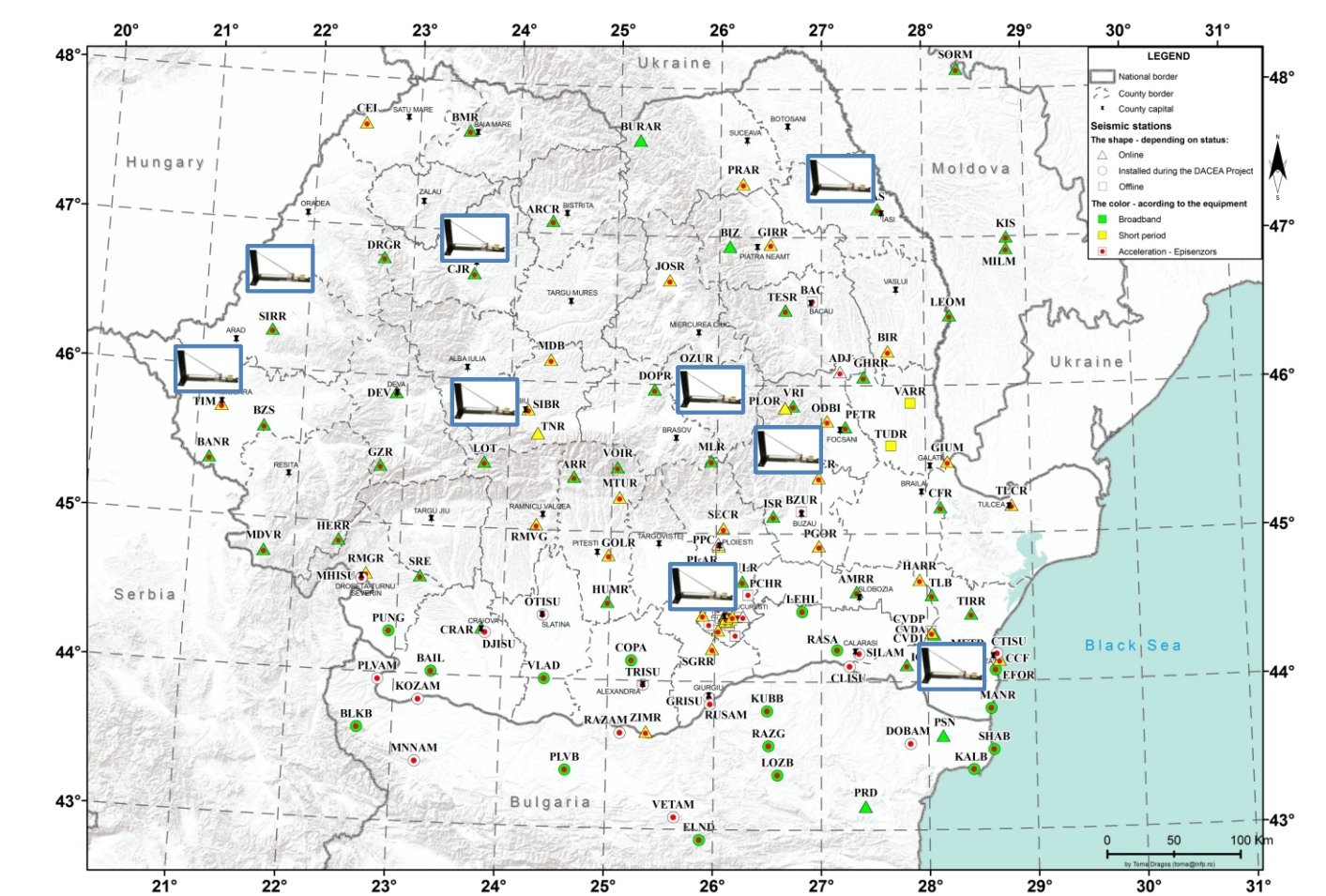
- students don't want theoretical aspects about the earthquake activities,
- activities that address practical issues in an interactive and a relaxed atmosphere

Also, it was mentioned the importance of working in groups, of experiments and simulations to complement the presentations/ theoretical explanations. The study provided an opportunity for students and teachers to voice their needs and expectations and also it was made a connection between the authors' researchers and Romanian school environment. The educational materials developed have largely integrated the suggestions offered through this study analysis of needs.

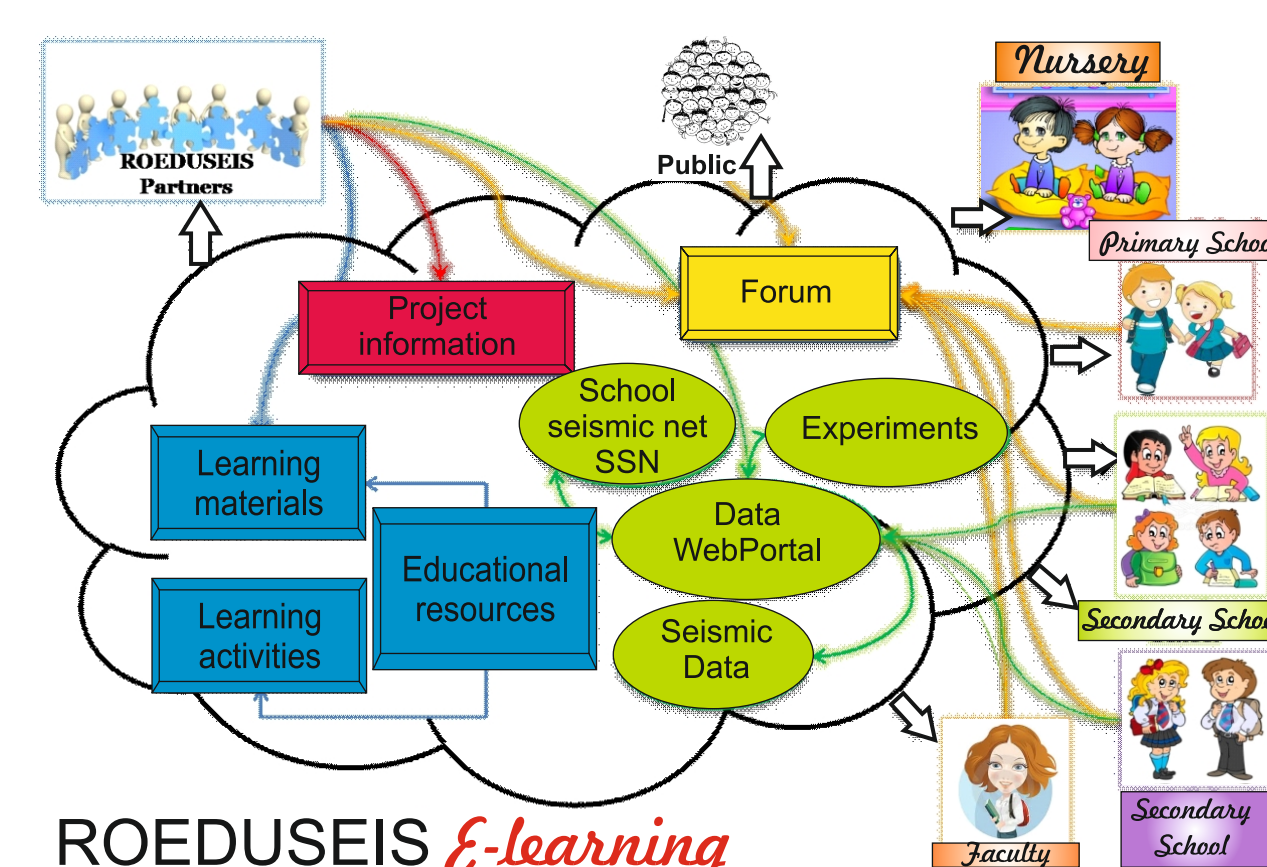
## RESULTS & CURENT STATUS

The network consist of nine seismic stations with SEP seismometers installed in high-schools from the most important seismic areas (Vrancea, Banat, Făgăraş, Dobrogea), vulnerable cities (Bucharest, Iasi) or high populated places (Cluj, Sibiu, Timisoara, Zalău).

## Installing seismic network in schools



## E-LEARNING



ROEDUSEIS e-learning



- It will facilitate the understanding of educational subjects and increases the efficiency of the learning process.
- Will have a user friendly interface
- It will be a modern e-Learning platform. It does not require the physical presence of the pupil in the classroom - he/she can study and participate in class both from home and from school
- Will host the data portal - a module for archiving, explore, view and select seismic events recorded by the School Educational Seismic Network.
- Will disseminate informations about project development and promote the initiative for the general public
- Will be developing a support network of committed Earth scientists and educators around the project.

## PROJECT OUTLINES:

- The first Romanian project developed by scientists dedicated to teachers and students
- The first joint project between Research and Educational Institutes and Universities that aims to change the way of how Earth Sciences are taught at pre-university level
- A clear and continuous interaction between scientist - teacher - students
- The first initiative for seismic risk prevention through education that contain a study analysis, educational materials, workshops and dedicated e-tools
- Introduce in schools the use of scientific instruments like seismographs (SEP Seismometer) and experimental methods (seismic data analysis) that are usually restricted to research laboratories

## PERSPECTIVES

- Integration of Romanian seismic educational network in the context of European educational networks and, as a consequence, increasing Romanian visibility at international level;
- International alliances between Romanian schools and foreign schools that developed similar projects, students mobility programs (ex. UK; France, Italy, Germany, Irland, USA, etc.);
- Experience exchange programs between schools involved in this type of projects;
- Developing didactic and informing activities at all study levels within the Pilot Centers (Seismo Labs) organized at NIEP Bucharest and Faculty of Environmental Sciences and Engineering (UEB), Cluj-Napoca City;
- Providing a framework for creating public awareness on earthquake risk and emergency situations and informing framework within the Pilot Centers considering others risk categories as well;

## Aknowledgement:

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