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## DELIVERABLE

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### 3.3 Compilation of resources for Seismo@school

<b>Work package</b>	WP3: Networking Seismo@school outreach programs (NERC)
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## Table of Contents

1	Summary.....	3
2	Resources .....	3
3	Resource dissemination.....	6
4	References.....	9

## 1 Summary

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Over the past few years many educational resources, print and web documents, software, and videos have been produced by educational seismology programs across Europe. National educational programs in educational seismology currently support science and geoscience teaching with hands on activities, and use relevant data sets with societal relevance. Many valuable resources have been and are presently being created in the framework of national and international projects, either with a pure educational focus or just aiming to “spread the science” in schools for the young generation but also for the general public. SERA is the "Seismology and Earthquake Engineering Research Infrastructure Alliance for Europe" a project distinguished by the size of its partnership, expertise and ambitious objectives, is mainly focussed on bringing a significant contribution to improving the access to data, services and research infrastructures, and deliver solutions based on innovative R&D in seismology and earthquake engineering, aiming at reducing the exposure of our society to the risks posed by natural and anthropogenic earthquakes. In this broad picture education comes as natural as research. Having as background a series of successful EU funded projects (NERA, NERIES, SERIES, etc), SERA clearly encapsulates the important role of science education and aims through the activities of NA1 group to continue building resources and training teachers in the STEM field in general, and Earth Science and Engineering, in particular.

What is different in the present approach, compared with previous initiatives, could be summarized as a better dissemination of existing or newly collated resources using a reference sharing platform already popular and validated by the users (teachers and educational professionals). This will allow a much broader dissemination of project resources as well as a bigger estimated impact quantified in terms of discoverability and usage.

With this purpose strong links have been created with SCIENTIX and an ad-hoc network starting with SERA members and completed with most of the important organizations involved in education using seismology as a tool, at a global level.

The present report is just one of the deliverables generated by 5 complementary WP3 tasks.

D3.3 Resource collation and publication is a description of the main categories of resources planned to be generated (or collated), validated as workshops activities to be published on educational platforms and promoted to the global educational community. Being a mid-term project report it is just a snapshot of the present, the detailed list of resources held at these platforms will be developed and expanded in the second part of SERA project.

## 2 Resources

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As the name already state SERA is an alliance of partners (and projects) with a strong background in developing and implementing state-of-the art research methodologies and also placing as a priority the activities of outreach, training and education, reinforcing the importance of science and research for society, starting with ones that prepare the younger generation (through their teachers) and also approaching the general public.

WP3 members are making full use of the resources already developed by partner institutions, collecting the most relevant ones and using them in activities delivered during dedicated teacher’s workshops. This workflow is intended to validate and select, using feedback from workshops participants and also opinions from educational professionals, the best practices in terms of resources and collate them in a packaged to be broadly disseminated.

If we consider the target group, resources could be, in a simplest mode, categorized as follow:

1. Resources for teachers and students
2. Resources for professionals acting in science education domain

In the first, that we also identify as the main resource collection, three type of categories clearly differentiate:

1. Training resources (collections of activities delivered at teacher training sessions)
2. Booklets and activities books used by partner institutions
3. Interactive programs and applications

### 1. Training resources

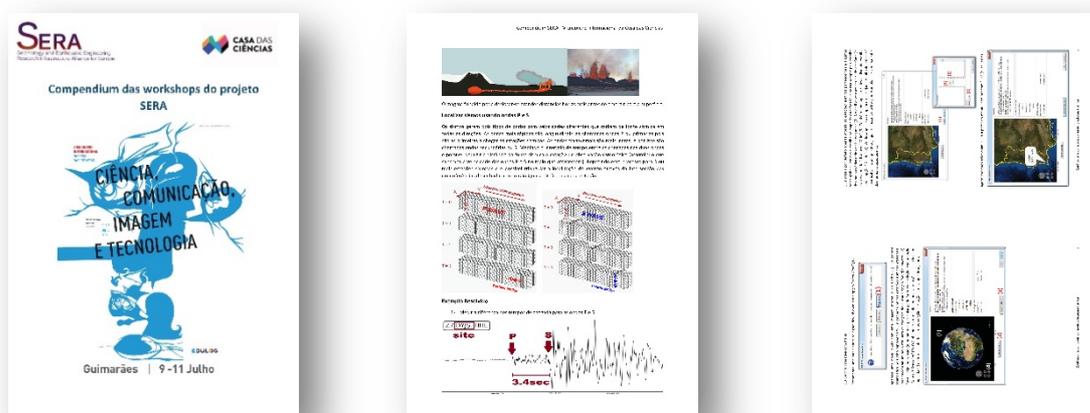


Figure 1: First page captures of SERA workshop compendium

With a long history of workshops aiming to improve teacher’s background knowledge in geoscience, and practical hands on activities to discover new materials to teach in the classroom, SERA partners, in the framework of NA1 are testing, validating and publishing a collection of activities as a mix of hands-on experiments. The activities deal with a series of topics that come from the expertise of the partners and the domains they represent (mainly seismology and engineering, but also citizen science).

Two main workshops have been already delivered to teachers in Romania and Portugal, with 4 parallel sessions with topics related to earthquakes, plates tectonic, seismic buildings safety, planetary science and also information connected with local/national realities (seismicity, seismic risk and vulnerability). Teacher training sessions were deliberately chosen to be organized within wider educational events, considered to be relevant in the landscape of non-formal education. One of the reason is to link seismology@school concept to professionals, institutions and initiatives that consider education for science and innovation, remains critical for understanding the world we are leaving in and pro-actively contributing to its sustainable development. In this way important links have been made with the SCIENTIX project, a landmark platform for the distribution of educational resources developed on research projects – objective consider to be a milestone of SERA project (more details in the next chapter).

Activities and resources used in teacher training sessions have been evaluated by participants and they have been put together in a compendium. Even as they are being made freely available, special attention has been given to proper acknowledgment of the intellectual property rights and ownership.

In the second part of the project, for all those materials proven to be useful by teachers in the classroom, animations and videos will be developed, some of them having already been recorded during the workshops delivered.

## 2. Booklets and activities books

To facilitate how to teach seismology at school, many hands-on activities ideas and innovative material for the classroom have been proposed and made available on different projects websites. In the framework of SERA project what is considered to be an added value is the translation (by project partners) of resources in national languages. This will remove the language barrier, a problem often mentioned by teachers who want to use valuable resources published in another language. To be mentioned that some booklets have been published only at national level, in this way they will be made available to a global community of educators. It is also the case of resources developed by partners in previous projects and which after the implementation period of the project are no longer accessible online, thus capitalizing on the results and resources developed for the community and thus returned back to the community.



## 3. Interactive programs and applications

Another category of resources explored are the applications developed and used in outreach and educational activities in the fields of seismology and engineering, especially the ones developed under an open source licence, available to be upgraded and/or translated. Just giving to examples below:

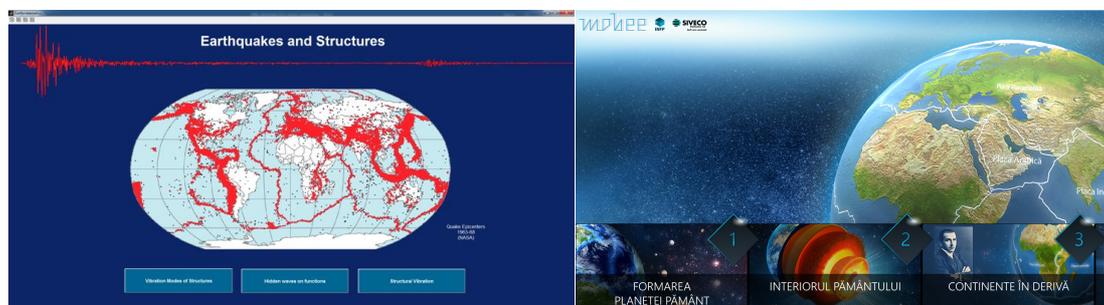


Figure 2: Web or standalone applications

On the occasion of the International Year of Mathematics of Planet Earth (2013) Sérgio Oliveira (Portugal) led a group that developed the Matlab interactive application “EquakeStruct”. Using the

developed interactive program EquakeStruct the users will see the vibration modes of a dam, a bridge and a building. They will see that some problems (resonance effects) can arise when a structure is excited by base vibrations with a frequency that matches some of the natural frequencies. Finally it is shown how a seismic accelerogram can be studied as a sum of harmonic waves whose amplitudes and frequencies should be known.

In the framework of Mobile earthquake Exhibition project (NIEP, Romania) an open source application that presents the tectonic causes of volcanoes and earthquakes, focusing on transposing information in an interactive way (works very well on a touch screen). Starting from the formation of the Earth and the delimitation of its internal structure, the application goes on to explain to children the notions of continental drift, tectonic plates and the types of contacts between them, the elements of an volcanoes, earthquakes on the Globe, or fault systems.

In the same manner web based applications will be translated in multiple languages by SERA partners and disseminated through project activities. The first example is the Mars@school developed by Dr Anne Sauron (ETH Zurich) application available now in three languages, in the process to be also translated and offer to teachers from SERA partners' country



This approach which aims to link complementary initiatives at European level closely follows SERA's vision, while ensuring the most efficient use of resources developed by projects and maximizing their impact by multiplying the dissemination opportunities

### 3 Resource publication and dissemination

Whichever the particular goals of a project were the formulation of relevant project materials and other resources has always been common practice. As well most of the current projects heavily rely in web portals to share project content and to ensure sustainability and continuity within a project.

This is not necessarily a good practice in the case of materials dedicated to teachers. Nowadays, among the most widespread tools supporting the work of teachers are gateway of educational resources.

From the beginning SERA project position itself in finding the right partnership to promote outreach and educational materials created, updated, adapted or translated during the project lifetime. Past experiences have clearly demonstrated the particular requirements, effort and resources needed to sustain such a platform in the long run and achieve a level of promotion and interaction as imposed by the project's requirements. After prospecting for potential solutions and candidates, the most suitable initiatives for hosting and disseminating SERA resources is choose to be SCIENTIX.

The community for science education in Europe (SCIENTIX) is a FP7-SIS initiative at its third edition that promotes and supports a Europe-wide collaboration among STEM (science, technology, engineering and maths) teachers, education researchers, policymakers and other STEM education professionals. Since 2009, this project has been promoting and supporting a Europe-wide collaboration among STEM educators by facilitating regular dissemination and sharing of know-how and best practices in science education. Over its first six years, it gathered 200 publicly-funded science education projects, and 1,000 STEM teaching and learning materials. SCIENTIX is building on this impressive bank of online knowledge and expanding to the national level. It is establishing a network of National Contact Points (NCPs) covering 30 European countries expanded afterwards to a Teacher Panel which now consists of 90 teachers from across Europe, with the aim of connecting with STEM education professionals, organising national workshops, webinars and networking events<sup>1</sup>.

So one of the WP3 objectives was to ensure strong science-policy links and connections with SCIENTIX, work done in the framework of the first SERA workshop ([www.sera-eu.org/en/Dissemination/teacher-workshops](http://www.sera-eu.org/en/Dissemination/teacher-workshops)). This step was followed by submission of the SERA resources to be validated by SCIENTIX team before being uploaded on the portal.

Bellow we will underline 4 main reason why Scientix is envisage as a long-term repository for SERA educational and outreach resources:

1. Long-term sustainability and evolution: The Scientix portal (<http://scientix.eu>) has been running for over 7 years. Until the summer of 2016, the portal was available in 8 languages. Since Sep 2016, the navigation of the portal, as well as key pages, are available in all 24 official EU languages.
2. Internal mechanism of dissemination and exchange: media presence, hosted events, email digests, thematic newsletters, online meeting rooms and blog articles
3. “Translation on demand” service - Scientix it is the only portal in the world that offers the translation on demand service. If a resource hosted on SCIENTIX gateway has reached three requests for a language, the Scientix team will check the requests, and if accepted, it will be translated. The resources accepted for translation will be published on the Scientix portal after one week to two months, depending on the length of the resource. Translations are available into the official languages from European Union countries, territories, and regions, and FP7 associate countries ([www.scientix.eu/request-translation](http://www.scientix.eu/request-translation)).

Even if the large SERA partnership provides the premises for some resources to be translated into national languages, the unique service provided by Scientix is still a guarantee of maximizing the use of published resources.

4. Support of national strategies - Scientix National Contact Points (NCPs) provide the link between Scientix at a European level and national activities. There are two types of NCPs: Ministries of Education (MoEs) and organizations acting as NCP selected through a call for interest. The MoEs are also members of the Ministries of Education STEM representatives Working Group (MoE STEM WG), a platform of discussion and exchange for MoEs regarding their STEM education policies. By Nov 2017, 26 countries had a NCP, with 18 of them also in the MoE STEM WG and a number of national work<sup>1</sup>

As an intermediary step, until the resources will be available on Scientix portal, all the materials developed or collated by WP3 team will be discoverable on SERA portal.

Another important aspect for choosing a dedicated educational gateway as SCIENTIX for resources dissemination is the community of STEM educators you gain access to. By October 2015 (last published stats from Scientix) more than 5000 registered users have access to all the tools developed offered by

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<sup>1</sup> SCIENTIX3 – Report summary - [https://cordis.europa.eu/result/rcn/223917\\_en.html](https://cordis.europa.eu/result/rcn/223917_en.html)

the portal. Just to mention the mach-making tools that allows project managers to identify and contact teachers and members of the Scientix community for specific purposes, such as to invite them to collaborate on projects in STEM education[2]. These greatly facilitate the interaction between the resource developer and direct beneficiaries.

Another important aspect considered by SERA members is to collect feedback for resources submitted. This could be done, as we did, but with limited resources, during the SERA workshops, targeting participating teachers, or could be done in a virtual environment offered by Scientix. A lot of general remarks, related to optimum type and format for resources to best serve teachers and their students, are already collected and could be used as a guide for adapting the already existing resources. Here we could mention: resources should be aimed at specific age group, be more interactive with less text and more video.

The second category of resources created in the framework of SERA project consist of presentations delivered during experts workshop focusing on Educational and Citizen Seismology. This discussion workshop was held at the Geological Society meeting rooms in London on 15–16 February 2018, attended by 47 registered delegates from 18 different countries: Australia, France, Greece, Ireland, Israel, Italy, Nepal, New Zealand, Palestine, Panama, Portugal, Romania, Spain, Sweden, Switzerland, Trinidad, UK and the USA. One of the meeting outcomes is a collection of short presentations delivered by participants and uploaded on YouTube channel. Recordings of keynote addresses from those most experienced in developing equipment and running school and citizen seismology programmes, are shared with the community in order to facilitate future collaboration and encourage the growing number of institutions around the globe interested in developing such programmes

<https://www.youtube.com/playlist?list=PLxpzCdkdwTWATfRu9KpSRSK83-SJKaQVM>

**EduCitiSeis18 | Discussion Workshop on Educational and Citizen seismology, London, 15-16 Feb 2018**  
 10 videos • 182 views • Last updated on 24 Apr 2018

**British Geological Survey** **SUBSCRIBE 3.6K**

In February 2018, the British Geological Survey convened a two-day discussion workshop on educational and citizen seismology at the Geological Society of London.

The meeting was designed as a forum for experts in educational and citizen seismology to get together and discuss areas of mutual interest and discover potential synergies and future collaborations.

- 1 **Why is LastQuake a successful citizen science project? | #educitiseis2018**  
British Geological Survey (34:14)
- 2 **Past, present and future of Raspberry Shake | #educitiseis2018**  
British Geological Survey (27:28)
- 3 **Educational Seismology in the USA | #educitiseis2018**  
British Geological Survey (25:47)
- 4 **AuSIS: The Australian Seismometers in Schools Network | #educitiseis2018**  
British Geological Survey (12:49)
- 5 **Tuned in to Mars... from 'SISMOS à l'Ecole' with SEIS InSight | #educitiseis2018**  
British Geological Survey (19:43)
- 6 **The New Zealand Network for Seismology in Schools | #educitiseis2018**  
British Geological Survey (31:47)
- 7 **The interface between citizen science and civil protection | #educitiseis2018**  
British Geological Survey (17:21)

## 4 References

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<http://marsatschool.ethz.ch>

<https://mobee.infp.ro/aplicatii>

<http://www.scientix.eu>

<http://www.sera-eu.org>

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