

Online Tools and Games

Online interactive tools and games can be used via Internet or mobile apps and such tools should be easy to use and interesting to general audience and could be used e.g. in schools in teaching. Below few examples are introduced in more detail: carbon tree (<http://www.hiilipuu.fi>), which is an online tool to learn about photosynthesis and respiration of a tree; Deep Sea Spy (<http://deepseaspy.ifremer.fr>), which is to raise awareness towards species living in deep sea and supporting greatly the work done in EMSO RI and serious gaming competition for school kids supported by LifeWatch (<https://www.lifewatch.eu/serious-games>). One very appealing topic is citizen science, where online tools could be used to involve citizens into the Global Challenges. For example, an app for smartphones that is useful to collect information for multiple purposes. All of the mentioned tools and games require funding to be developed and maintained, but can potentially reach global audiences. However, to attract people to use these online tools and participate in the competitions require advertisement and good connection to schools.

RI can organize online gaming competitions like those LifeWatch is coordinating and ENVRIplus project used. The competition can be based on a scientific gaming, whose content and target audiences can vary. Serious games are one of the most interactive tools to teach young people, in an engaging way about the key subjects of the RI (marine, ecology, biology etc).

Advantages: Potentially hugely important ways to communicate and get wide visibility for the RI. They can have educational aspects and create positive atmosphere towards RI. Good way to reach school children and their parents, educate them on RI related topics and to get visibility.

Challenges: Require significant investments. The online games are hard to make successful and need special attention to gain interest. Can be challenging to engage people to use the tool or game. Often tools and games need simplification of the scientific facts and results. Need of very motivated development team.

Resources: Development team needs to have knowledge both on the subject and technical solutions. In planning competitions for school children RI needs to understand the school year schedule and collaborate with the schools which requires involvement from schools (teacher and students).

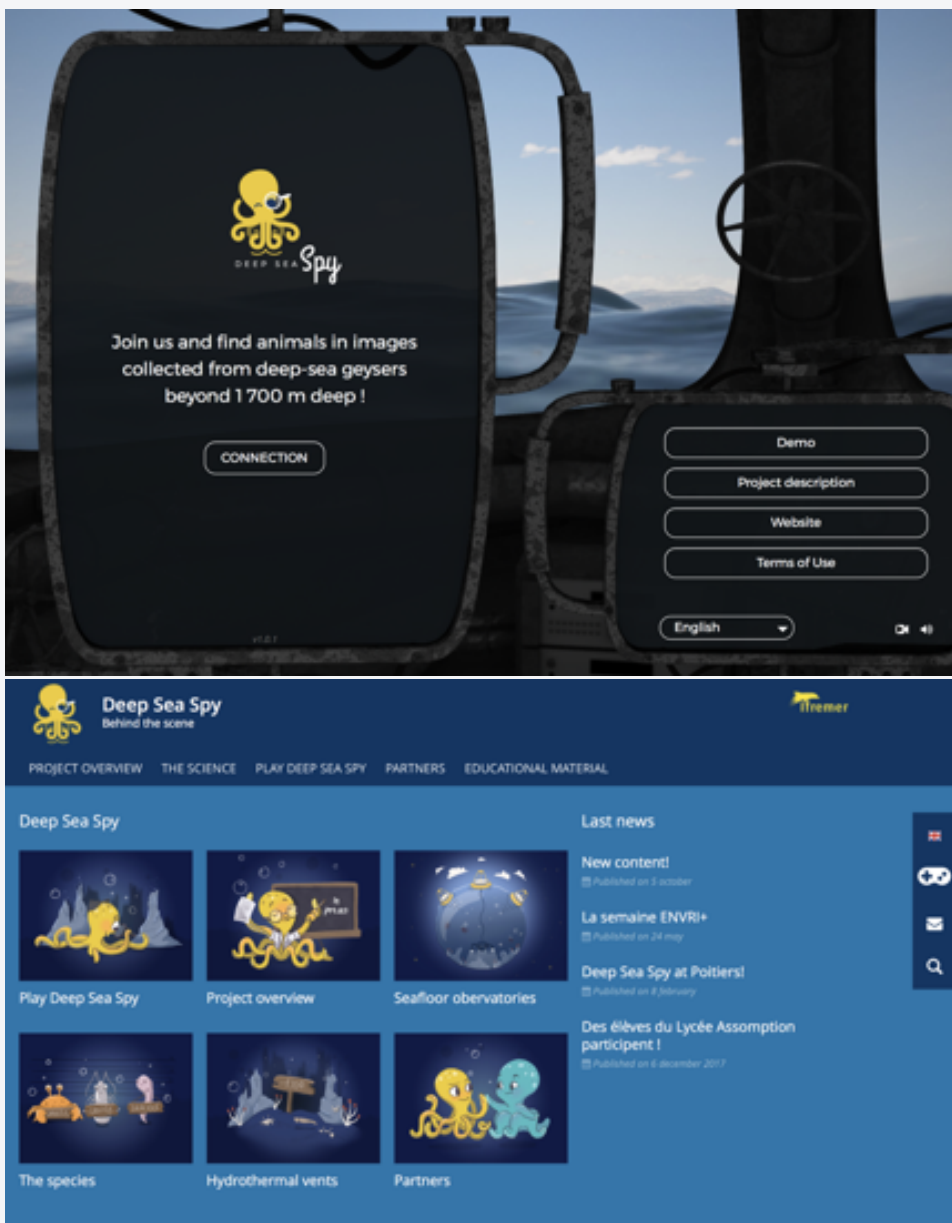
Recommendation: If possible considering the requirements, these activities are of high interest. Possibility of direct interaction with the public is invaluable.

Game example: Deep sea spy.

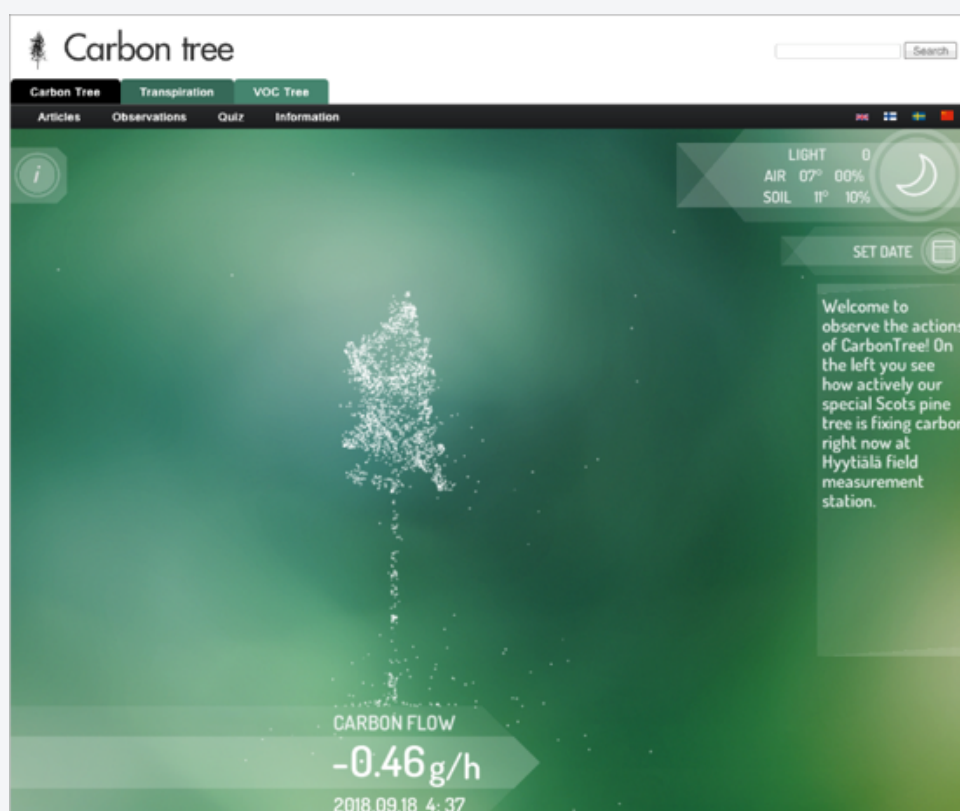
Ifremer (a French institute that undertakes research and expert assessments to advance knowledge on the oceans and their resources, monitor the marine environment and foster the sustainable development of maritime activities.) in association with a company (Noveltis, Labège, France) has developed a web-based application linked with a structured database. The software is built as a game with dedicated missions. The goal of each mission is to annotate a series of images extracted from archived video sequences coming from deep-sea observatories. The annotation tool has been developed and was officially launched in March 2017 through French media and international scientists' network (Interridge, Deep-sea biology society). The first public mission attracted more than four hundred active participants and led to the annotation of more than fifteen thousand images.

The Deep-sea Spy project invites to discover hydrothermal fauna and participate in the Deep-sea Environment Lab's research. The spy consists of informational part and a game where the user needs to identify the species appearing on a photograph. The game is available on two language, English and French. On the website you can find educational material that can be used for your own personal interest or in the framework of a class project: educational leaflets, educational booklets, links.

The visual guidelines associated with the tool, including a logo, color codes and a dedicated font has been developed by a graphic designer. From the admin webpage, the game administrators can have an overview of the main statistics of the application and ongoing mission including number of images annotated, number of users per week, month, over the mission and globally.



Online tool example: Carbon Tree. Discovering the photosynthesis and respiration of a tree. Carbon tree website is an easy and illustrative way of learning about the photosynthesis and respiration of Scots pine trees. At the website, a Carbon Tree animation is based on the measurement data that consist of observations made continuously in the surroundings of a Scots pine forest, located at Hyytiälä Forestry Field Station ([SMEAR II](#)) in southern Finland. The Carbon Tree represents an average Scots pine tree and the virtual tree has been recorded since 2009 with the ICOS (Integrated Carbon Observation System) equipment. From the Carbon Tree homepage you can see how the Scots pine tree is fixing carbon right now at the SMEAR II station or look at it on different days and weather conditions. With the interactive Carbon tree visualization found from the website one can explore the carbon flow, its components and weather conditions that affect it. One can select the time span for the visualizations by setting the dates. The website includes also another animation, called Transpiration. With that animation, you are able to focus more closely on the functions of a plant leaf, and adjust the abiotic environmental factors to see how the leaf reacts to them. There are learning videos at the website to see how the interactive animations works: [Carbon flow video](#) demonstrates how you can examine the components of carbon flow; [Weather conditions video](#) shows you how to study the effects of environmental conditions on the carbon flow of a Scots Pine; [Observations video](#) familiarizes you with the tools for viewing the past observations of carbon flow and weather conditions. The website is available in four languages (Finnish, Swedish, English and China) and the measurement data used in the visualizations is open data and can be downloaded. The animations are easy to use and interesting to the general audience, and they can be used e.g. in schools for teaching. On the website you can find ready-made quizzes, but there are other ways to use the Carbon Tree for education. For more scientific audience there is other relevant information available at the website: To learn more about carbon cycle, abiotic factors and interaction between climate and forests, you can pick one of the several scientific articles available at the website. Carbon Tree is a part of [Climate Whirlumbrella](#), which aims to increase public awareness of the interaction between forests and climate and to provide a holistic and general understanding of the forefront of climate and ecosystem research. In addition, the Climate Whirl aims to break the boundaries between science, art and education. The Climate Whirl originates from multidisciplinary research at the Hyytiälä Forestry Field Station, as well as from an equal dialogue between scientists and artists. In addition to the Carbon Tree, artist residences, workshops and seminars are organized under the Climate Whirl.



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Gaming competition: ECOPOTENTIAL4SCHOOLS. ECoPOTENTIAL project that is funded by the European Horizon 2020 program is organizing a competition for secondary schools in Europa with the aim of making the environmental research infrastructures known and promote the key research topics with which our companies will have to face in the coming decades. ECOPOTENTIAL4SCHOOLS (<http://ecopotential4schools.lifewatchitaly.eu>) is an online game addressed to students coming from all European Schools. With it, a team can test its skills in the field of Scientific Research and join the final online competition on April 2019. The 2019 online competition has been designed to be quite demanding and each team has to collaboratively answer to get to the final score. This year, they propose three versions of the game, dedicated to the main ECOPOTENTIAL protected area environments: **Coastal/Marine**, **Mountain and Arid/semi Arid**. The first two levels of the game are dedicated to the knowledge of the geography and ecology of the **Protected Areas** belonging to these environments. The third level fulfills aspects of the proposal and serves to consolidate the basics of the **Scientific Method** referring to biodiversity. Each team will have the opportunity to choose to play from one to three games. Only the best score will be considered!

