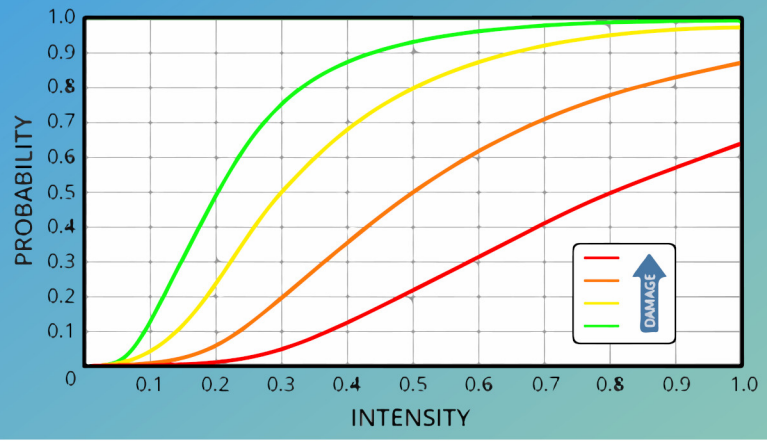
MAKING REALISTIC PREDICTIONS ABOUT BUILDING BEHAVIOUR

To understand how the school buildings of Kaštela would actually react during an earthquake, scientists at the University of Split developed a digital model capable of combining the buildings' structural data, taken from design documents, with the information obtained from OGS investigations.

Thanks to this model, it was possible to simulate the behaviour of the buildings during an earthquake in a realistic way and obtain reliable results on their seismic resistance, as well as on the probability and severity of damage in different scenarios.

These simulations made it possible to accurately assess the safety of the school buildings, taking a concrete step toward improving the protection of Kaštela's schools.



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STRENGTH

CONCRETE STEP TOWARD SAFER SCHOOLS IN KAŠTELA

The effects of an earthquake on buildings depend not only on its intensity but also on structural characteristics and on the type of soil on which they are built.

We cannot control the force of an earthquake, but we can greatly reduce its effects by acting consciously on buildings. Understanding how a building would react to an earthquake allows experts to assess its safety and, if necessary, plan interventions to make it more resistant and secure.

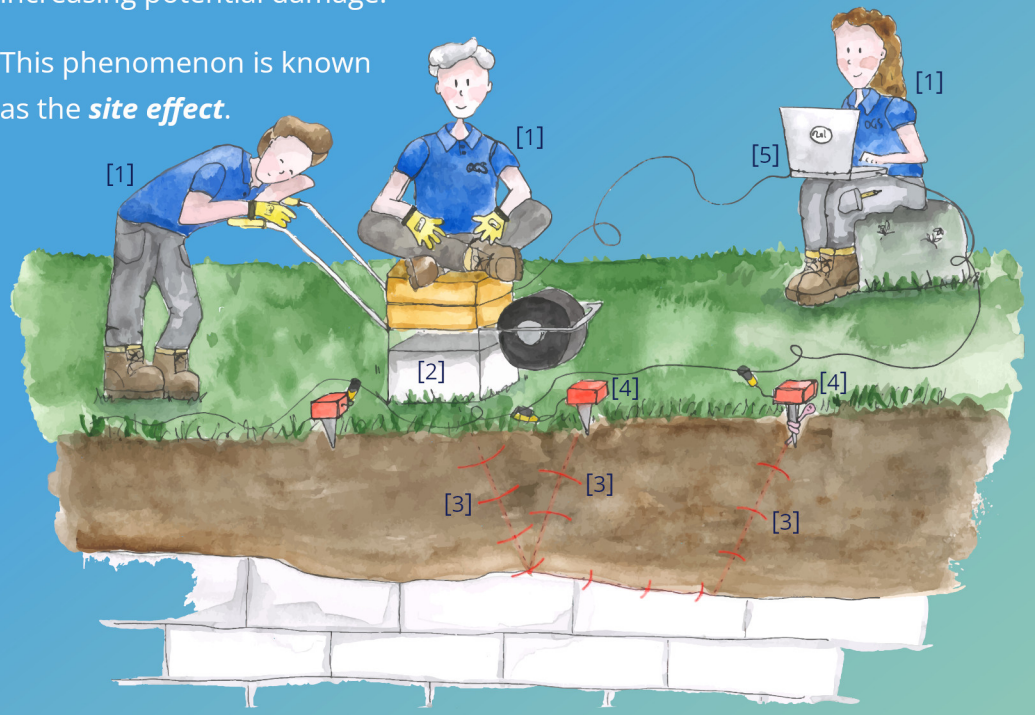
As part of the **STRENGTH** project, the *Faculty of Civil Engineering, Architecture and Geodesy* of the *University of Split* (***FGAG***) and the *National Institute of Oceanography and of Applied Geophysics* (***OGS***) analyzed **four schools** in the **City of Kaštela** to understand how resistant they are to earthquakes.

www.italy-croatia.eu/web/strength

THE IMPORTANCE OF KNOWING THE GROUND BENEATH A BUILDING

During an earthquake, the stresses acting on a building vary depending on the type of soil on which it is constructed:
- the more ***compact*** the soil is, the more uniformly buildings move, and the lower the probability of damage;
- the ***softer*** the soil is, the more the ground motion is amplified, greatly increasing potential damage.

This phenomenon is known as the ***site effect***.



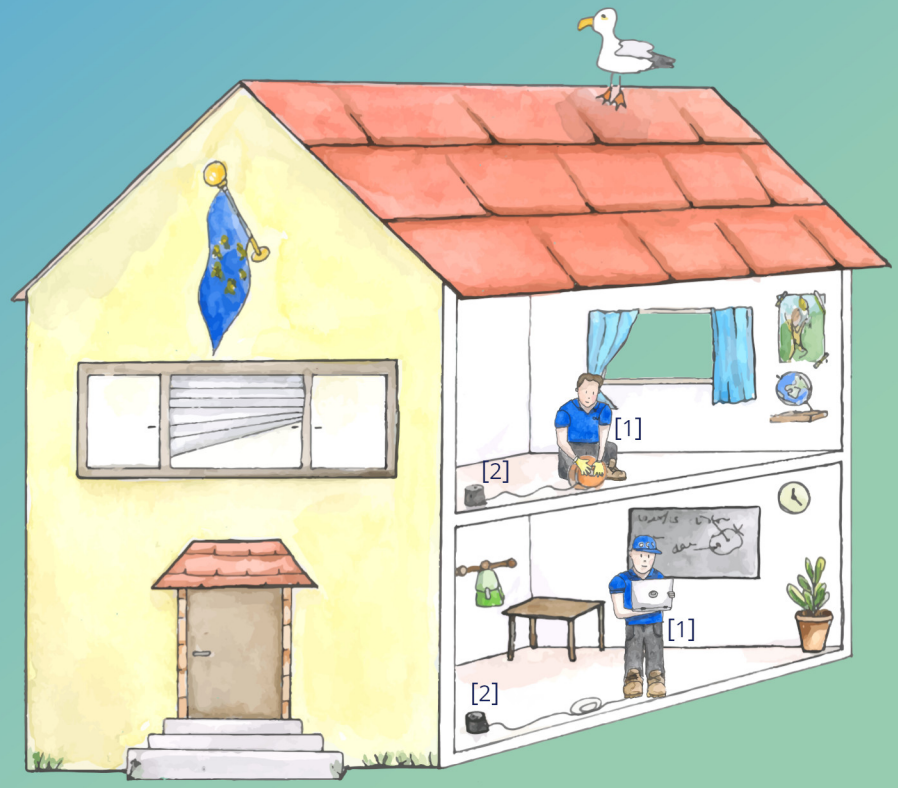
To understand what type of soil the schools of Kaštela are built on, OGS scientists [1] carried out an investigation called ***geophysical surveying***.

How does it work?

With a special machine [2], the ground is made to vibrate as if producing a harmless, controlled "micro-earthquake".
These vibrations, called ***seismic waves*** *[3], travel in different ways and at different speeds depending on the type of soil they pass through.*
By recording the arrival of the seismic waves at various distances from the source using sensors [4], it is possible to calculate their velocity [5] and thus determine the ***type of soil they have moved through***.

BUILDINGS DO NOT ALL BEHAVE IN THE SAME WAY

The way a building responds to seismic shaking depends not only on the type of soil on which it is constructed, but also on its structural characteristics: *materials, height, shape, state of preservation, and more.*



To understand how the schools of Kaštela react when subjected to vibrations, OGS scientists [1] measured their **characteristic frequency** — the natural way in which a structure tends to oscillate when it is shaken.

How does it work?

Sensors [2] are placed at specific points in the building to measure tiny displacements and vibrations caused by natural sources such as wind, nearby traffic, and even the footsteps of students moving inside the school.

By analyzing the data recorded by the sensors, it is possible to understand how the building responds when it is excited and to determine its specific ***characteristic frequency***.