



## **Improve awareness to flood risk trough LEGO bricks and role playing games at Firenze (Italy)**

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The LEGO bricks constitute a tangible building material, simple, well-known and especially modular, which can guarantee immediate connection between theoretical and practical aspects and the introduction of new educational tools. In this framework, on the basis of project works carried out by the master students (academic year 2017-18) of the “Hydraulic Risk” course, a simulation model of river floods, which with LEGO bricks reproduces a significant portion of an anthropized territory crossed by a river reach and some LEGO scenarios have been developed.

The base frame of the model (122 cm x 80 cm) is made by three layers of wood material, covered with LEGO plates, and the LEGO bricks can be grafted everywhere on the surface.

The model, located in a plexiglass box and an external steel tray, is also equipped with a water storage tank and a submerged pump for the simulation of transitory flows and floods.

The current scenario includes: urban and industrial areas, a bridge and some elements dedicated to the mitigation of hydraulic risk. The geometry may be modified trough the grafting of other elements like vegetation, sediments, and other hydraulic and infrastructural elements.

A combined 1D/2D hydraulic model HEC-RAS of the current LEGO scenario has been implemented by master students (academic year 2018-19) “Hydraulic Risk” course in order to represent the flow inundation behavior in river neighboring areas. Based on the LEGO model, recently a video game version has been preliminary designed. Using the Minecraft platform, produced by Microsoft for PC, Xbox and Playstation, an actual serious game will be implemented on flood risk that has the city of Firenze as reference scenario. The flood scenarios of the past and those resulting from the hydraulic models developed by the research group will be used to implement “role-playing games” related to the design of mitigation and hydraulic risk management measures. The “digital bricks” of Minecraft can be used to build three-dimensional objects, and to develop platforms entirely in three-dimensions, where players can interact each other and with the surrounding environment.