

# **GRaph-based Model (GRAM) to assessment natural hazard risk of complex systems**

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In the last years, disaster risk and extreme weather events have been recognized as top global risk both in terms of likelihood and impact. Assessing the risk of such events is an important and challenging problem in order to inform decision-making processes concerning risk mitigation, preparedness, response and recovery. In today's intricate socio-technological world, characterized by strong urbanization and technological trends, the connections, interdependencies and interactions between exposed elements are crucial. These complex relations call for a paradigm shift in collective risk assessments, from a reductionist approach to a holistic one.

With regard to reductionist approaches, the risk of a system is estimated as the sum of the risk of its elements individually assessed. In contrast, a holistic approach considers the whole system as a unique entity of interconnected elements, where those connections are taken into account in order to more thoroughly assess risk. The seminar aims to show an innovative modelling approach based on the Graph Theory and to demonstrate the feasibility and usefulness of this approach through its application to the case of urban flooding in Mexico City. Finally, this talk will present some preliminary results about indirect impact generated by cascading effects in case of pluvial flood hazard at different return periods.

**5<sup>th</sup> April, 2019**

**Eurac Research**

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