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The impact of hazards on the city tissue - 3D representation and digital databases. The 1755 earthquake on Lisbon: 3D representation of the city before and after compared to the hazard prone zone affected by communist demolitions in hazard prone Bucharest

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The focus of this ongoing research, supported by both national funded projects in Romania and international cooperation networks for an exchange stay in Portugal is the 3D modelling of changes in the urban tissue by catastrophic events. For this purpose central Lisbon (Alfama and Baixa) as well a protected area in the centre of Bucharest were considered. The purpose itself was to establish to which amount 3D city models are useful, usable and used for sustainable development decisions, in this case protection against hazards. Results concerned:
1. defining urban planning layers, historic view: theoretical framework. The work comprises review
of existing literature on:
a. historic development of Lisbon around the earthquake impact of 1755 (before, during, and after the earthquake) as well as the intervention in Bucharest (impact of the 1977 earthquake and misuse, vulnerability today, development of future strategies, ex. emergency planning);
b. Defining immersion in space and time:
i. Representing memory (classification of literature related to the memory of disasters);
ii. The role of games vis-a-vis the role of literature (real-time representation in Second Life versus an own developed application).
2. investigation of the role of memory in representation of ruins, in relocation in reconstruction after the earthquake;
a. For Lisbon: identifying the monuments (churches) affected by the earthquake for example in Kozak's collection and in the pre-1755 3D model http://lisbon-pre-1755-earthquake.org/ as well as identification of the constructions replacing them (except Carmo convent) on site and in the Google Earth 3D model. Comparison to before and after photography approaches, available for later events, when photography was available, and to the Piranesi project for Baroque time. For Bucharest: identifying the monuments and their displacement, and of places for emergency housing via 3D modelling,
b. literature review of articles comparing satellite imagery and eye-level view in identification of earthquake damage.
3. formulation of definitions for semantic enrichment:
a. .comparison of the models to other 3D historic models within the action (Liege, Nantes) – differences and lessons to be learned,
b. Sketching future works (building of digital database). While for Lisbon the timber structure of the "pombalino" buildings was considered, and the database will be aimed to correlate seismic hazard/local seismic culture but also availability of certain species in the forests as resources, for Bucharest reinforced concrete is the material considered. The project is on European buildings with reinforced concrete structure from the first half of the 20th century subjected to earthquakes. Rarely the structural system of buildings is documented in architectural history, and even more rarely buildings are listed monument because of it. The gap will be filled by a database of such buildings, using photographic material already gathered (as it is also the case for related timber typologies). Further a taxonomy and ontology for retrofit elements for these buildings is proposed. From the survey, over structural intervention to economic computations the same retrofitted and retrofitting elements are defined. Structural simulation results will be tested on applicability for economic impact analysis through: (1) Monte-Carlo simulation for extension, (2) comparison with real projects, (3) comparison with experimental results from European laboratories databases. All these will result into a decision system, employing the newest developments from games theory for economics and drama theory for conflict solving, but also the developed ontology approach.