Complex monumental heritage: problems and operational programs for post seismic restoration

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The seismic events that have affected Emilia in May 2012 have undermined extensively the historical monuments owned by public and private entities: after the phase of verification of conformity to standard, after the implementation of the most urgent safety measures and the reopening of the public utility buildings (primarily school buildings), today is faced with a phase just as delicate and sometimes problematic, if not properly framed and conducted, the programming phase of the restoration post-seismic, which takes into account the priorities and the specific characteristics of each situation, as well as the correctness of the restoration methods to be implemented and the clarity with which the project must be expressed. This is especially true when addressing the monumental heritage of considerable complexity, breadth and diffusion.

There are many reasons that determine factors of complexity in interventions on heritage monuments damaged by the earthquake and also the difficulty of the shares of strategic planning of interventions post-seismic, which for a number of years will require a lot of effort and work.

One of the most problematic issues is the configuration of the properties. When the building complexes historical of large dimensions, in the course of their long history, have undergone numerous changes of ownership and splits, or when they are intended for uses articulated and differentiated within, it often determines the division between proprietary institutions of different nature, or between public and private. Consider, for example, the historic cemeteries within monumental sites, where there are parts of public property (often owned by a management body, which can also be public), and other parts of private property (were sold when the cemeterial regulations were entirely different from the current) which sepulchral cells, chapels and monumental arches.

Just the historicity of these contexts determines not only the coexistence of properties of different nature, but also the difficulty to identify the actual owners. Of course, however, you cannot think that we can only act on the parts of public property and leave the other areas to the total autonomy of private (often completely absent), since the contiguity between public and private portions would completely fruitless, or even harmful, any intervention not-coordinated.

In situations like this, emerges the need to implement strategic plans that aim to address the specific parts of the competence of public operators, but also make choices placed within a broader restoration program, in which privates also are consulted and involved. You can schedule the instructions related to the damages into the single minimum units of intervention (extrapolating subgroups of privates belonging to the different blocks) and can be provided guidelines on actions to restoration that each private (or group of privates) can be developed through the involvement of trustworthy technicians: the coherence of operations, particularly of those aimed at mitigating the seismic vulnerability, in fact, it is absolutely necessary for a correct behaviour.
of the whole of the adjacent structures and should not find obstacles in the distribution of properties, even when this is particularly intricate. Sometimes assets are, not only very large, but also widespread over the territory. We recall, for example, types of assets such as historic bridges, widely scattered in the plain areas, which have always been crossed by an hydraulic network of drainage and reclamation: they represent situations which could lead to uncertainty about intervention skills (and on the more appropriate operational conduct) in this way the damage done by the earthquake occur in structures in which no one has done, for a long time, maintenance. To resolve issues of this nature should be addressed in an innovative way the investigation into the origin of the structures (for legislation fall into different spheres of responsibility, depending on the implementation of the road either before or after the watercourse): consultation of historical maps and archival documents, but also the transfer of the data in GIS, could provide a way to resolve the issues still uncertain, favoring the assumption of responsibility by the bodies identified as actually competent, triggering, followed virtuous cycles not only to repair the damage, but also the control and maintenance. In the early stages of post-earthquake restoration, another factor that determines the complexity is related to the prevision of use of the funds disbursed for various reasons: are intertwined, in fact, with long times of uncertainty, situations related to the level of insurance reimbursements, the provision of public funds, the reallocation of amounts already allocated before the earthquake to other interventions, etc. As for insurance reimbursements, there are different circumstances: in cases of greater extension and diversification, such as the vast wealth owned by the territorial authorities, can be used ways for the quantification of the damage parametric, whereas for historic buildings singularly insured must be shown clearly and conclusively the increased of damage, together with the works and the costs associated with the recovery and restoration in the ante quem situation, counting separately the amounts relating to any additional seismic upgrading and restoration of the building as a whole, that is important to predict and put in place. Basically it is to avoid
litigation where the monumental complexes were already previously subject to widespread lack of maintenance and to preceding structural issues, to be certain of the amounts obtainable, to shorten the time for the recognition of repayments. In these situations, it is therefore necessary to draw up documents of a preliminary nature, and yet already set correctly, comprehensive and complete, which allow to the owners to obtain adequate reimbursement by insurance companies, on the one hand, on the other hand, to decide on possible further measures for the structural improve, knowing in advance the economic commitment.

There are also situations where the quake occurred at open construction sites, where were restoration projects already defined or works initiated (in the absence of specific works for the improvement of the structural safety), requiring adjustment during construction of the chapters of intervention and of the amounts to be used, over that of the priorities: in these cases it is necessary to review the projects and work, through the integration of the works programmed with extraordinary interventions of consolidation post-seismic, or redirection of the available funds to the most urgent works.

Even the ecclesiastical buildings, generally made up of large void volumes, were heavily damaged, and in a very large number, in the territory affected by the earthquake in May 2012: when faced with a situation too extensive to be solved all at once, there is a need to have a clear and general framework within which to set priorities, with respect to various aspects (value of the property, the level of harm suffered, how to use, etc.), in order to have consistent use of government grants with different times and ways (works for urgent safety measures, for post-earthquake restoration with funds allocated by tran-
Some pictures of the church of San Giuseppe Sposo B.V. Maria at Gaiba (Rovigo)

che, and so on). However, the damage due to the earthquake, although more concentrated in areas that are clearly identified, have also affected historic buildings immediately outside the areas identified as the seismic crater (and therefore facilitated with appropriate funds for the restoration and reconstruction), often for lack of maintenance or abandonment. In these situations, additional structural impairment, there is a need to raise funds through contributions of other nature, for example on the part of the banking foundations or of other institutions: procedures call for contributions, in these cases usually involve prior approval by the institutions for tutelage, and therefore requires to anticipate the work that, in the case of non-funding, is a non-recoverable cost. The preliminary definition of the project, therefore, must be both comprehensive and expeditious, that is clearly calibrated, methodologically well-defined and effective, but of rapid drafting: operational programs organized in this way may allow the release of prior clearance by the protection bodies, as an act essential to submit requests for disbursement of funds dedicated that are presented on specific notices.
The contents expressed by the post-earthquake restoration projects, both in terms of choices for structural interventions that consequent for the restoration of surfaces, are now identified as potentially problematic, for many reasons. In these areas of the Emilia where for a long time not had seen severe
seismic events, the preparation and experience of the technicians (but the same is also true for a large part of construction companies and workforces) was confronted with some difficulty: the shift of activities (also in relation to the economic crisis that affects the construction industry) from new construction and renovations to the restoration of historical heritage requires different skills and methods, and more specifically oriented. Where the project is not supported by clear historical knowledge and constructive (as well as structural), by a coherent conception, by attention to salient features of the building, by the appropriate calibration of the interventions, and where the drawings and technicians are not able to express these aspects, then you generate longer deadlines for approval, need for integration and revision, uncertainties regarding about the schedule for authorization and costs. To give means for resolving these issues can be offered on the one hand to professionists opportunities for training (but also to businesses), from the other side should not be excluded forms of address for the technical structures, at least to the public bodies that develop independently the project they need. These forms of commissioning clear of the contents of the project, that we might think of as forms of normalization, could be organized as tasks entrusted to professional external, with or without tenders: you think to institutions such as the Universities, who possess a wealth often historicized, and that, despite having their own internal technical departments, must award contracts for the design, through tenders to external experts. In such cases it is reasonable to work to prepare operational guidelines and supports for designers, while achieving greater control of the results and a lower uncertainty of the processing time.
Cracks due to the earthquake, in the historic buildings of the University of Ferrara

The pull out of the wooden floors by the wall following the earthquake, in the buildings of the University of Ferrara

For all those reasons, it is now necessary that the University (through its own qualified research facilities) supports owners entities of different nature and bodies asset managers of building complexes historical, working in close collaboration with them, so that they can deal with, the articulated stages of identification of strategies and programming for the monumental heritage characterized by specific complexity, also through its technical offices.

There are several reasons that make it possible and desirable, this type of collaboration, although it is not prompted by the recent Ordinance no. 60/2013 signed by the delegate Commissioner.

First of all, the University has the methodological skills, with particular reference to the fields of engineering and architecture (but also of all the spheres of interest to them tangents, such as for example the economy), that are necessary to deal with difficult situations, where issues of structural safety are present in historical contexts complexes. Also for the overall strategic vision that the university research groups are able to have, as well as the interdisciplinary relationships that they have the ability to put in place in order to achieve the proposed objectives; not least because, expressed through the activities on the territory in the course of their training activities and research, not lastly, because thanks to the activities expressed in the territory during the course of training activities and research were organized databases extremely useful and meaningful (partly georeferenced), which can provide a solid base to start operating.

The contingent need to rebuild and restore damage done to the heritage built by the recent earthquake, and perhaps even rethink the management which over time has been conducted on these goods, should be an opportunity to
improve in terms of safety, to act in a manner consistent with regard to the restoration work related to recovery operations, reducing vulnerability and structural improvement, to trigger good maintenance practices, management, and control that have so far been largely disregarded, but that is a fundamental step for the successful operations of far-reaching, particularly necessary when there is a huge investment of public money and the expectation of strong security among the population.

The economic sustainability, in fact, in a situation like that Italian (and only recently) it’s investing about one and a half million Euros per year for the prevention, while you spend annually about three and a half billion to repair the damage that occurred, this disparity is directing us to actions which maximize the choices in function of the likely risks to which the built heritage will be submitted in the future.

It’s need to tackle and solve the complex situations (through procedures not abstract, but in adherence to the actual needs of different types of goods), using all the support needed to unravel the most difficult issues that have been outlined by the previous examples, with regard to responsibilities and ownership, extent and distribution of the assets monumental who insist on the territory affected by the earthquake, addresses and content of the post-earthquake restoration projects, together with the refinement and strengthening the powers of the internal technical structures at different institutions (also to facilitate the continuation of the control and management of historical heritage in time) otherwise it will be strong the risk of further loss of significant fractions of historical monuments.