

EARTHQUAKES, RECONSTRUCTION AND MONUMENTAL HERITAGE

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1. Introduction

One of the first misconceptions to be dispelled in addressing the topic under examination, is that of the (presumed) irremediable conflict between 'conservation' and 'safety' which today, even more so than in the past, carries with it a great many negative consequences. It is rashly exalted by the media and easily adopted as a slogan by several influential political representatives, compromising an approach to the whole issue that should be more rational than emotional. From this misconception comes the serious and irreversible damage done by human hand to what remained of the city of Amatrice after the sequence of three earthquakes between the end of 2016 and early 2017 (recently almost completely razed to the ground) (Figure 1).



Figure 1. Amatrice (Rieti) at the beginning of 2018, after the complete mechanical removal of the rubble. It also involved the demolition of the surviving walls of ancient buildings that formed an integral part of the historical fabric but were 'unlisted'.

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Only the most important churches were saved, as they were considered real 'monuments' due to the fact they were 'listed' and protected by law.

It is as if the centuries-old historical fabric were worthless and not, strictly speaking, a 'monument' in itself, considered to be "material evidence of civilization" as laid down in the well-known Franceschini declaration of the Italian Parliamentary Commission in 1967¹. To this can be added the other somewhat 'dangerous', old-fashioned distinction between 'major architecture' (churches) and 'minor architecture' (the historical fabric composed of houses, road layout, squares and common urban spaces) (Figure 2). After almost a hundred years of reflection on the subject the distinction is outdated, passing from a point in time when attention was focused exclusively on the single monument to a wider vision of the monuments' environment and then, in the 1940s, to the 'monument of the environment' considered as a value in itself. This is confirmed by the advanced debate that took place roughly during the period from 1945 -1955, after the second world war, on the theme of post-conflict reconstruction problems and the necessary decisions to be made, very similar to those of today's post-seismic situation.



Figure 2. Document-based model reconstruction of the city (scale1:100) (degree thesis in Architecture – restoration) by G. Catalani, S. Lucchetti, A. Mirandola, M. Storgato (thesis supervisor Prof. Daniela Esposito, co-supervisors Prof. Alessandro Viscogliosi and Prof. Carlo Bianchini, "Sapienza" University of Rome, Italy).

The problem that consequently arises today is how to steer the process of 'reconstruction' or, better, of 'restoration' in the right direction, considering it involves valuable historic urban areas in Central Italy that are unmistakably identified as cultural heritage; whether they be 'major' or 'minor' makes no difference if, as in the case in question, it is tangible material of recognized historical, architectural and landscape value.

Other problems appear at this point, ranging from the type of architectural 'language' to be used for reintegration and reconstruction works, to how to deal with the 'urban

voids' and ruins of the inhabited centers which, due to legitimate reasons of seismic and hydrogeological risk, must be 'delocalized'; other problems regard the sense and meaning to be attributed to well-known, consolatory, recurrent expressions, but, in fact, are ambiguous and substantially anti-historical, such as, for example, reconstructing precisely "as it was and where it was", and perhaps "correcting" what was old; others involve the role to be attributed to contemporary architecture and urban planning; to maintaining the relationship with the landscape, fundamental for the identity of the places, especially as it includes some of the most beautiful, evocative areas, rich in traditions, in the whole of Italy.

Skillfully juggling the terms 'conservation' and 'innovation', a good answer with the right weight reserved for the conservation of precious valuables, might be one that expresses real concern for the future and not merely the 'past' of those communities that have been hard-hit. Most importantly, social and economic issues must be priorities, as well as those related to memory and identity, which must not be lost either.

It is no wonder that the Archbishop of L'Aquila, Monsignor Giuseppe Petrocchi, rightly requested the rapid re-opening of the Basilica of Santa Maria di Collemaggio, even if only partially, not exclusively for religious reasons, but rather, for eminently social ones, as a remedy to the risk of the inhabitants abandoning the ancient historic center.

The question is how to rebuild? How not to erase the architectural, as well as the urban signs of the inhabited centers affected by the earthquake? How to conserve even the poor 'material testimonies' of old buildings without razing them to the ground, as is now happening in several places?² What relationship should be established between "what it was and where it was" and the resolute possibilities offered by contemporary architectural language? Indeed, there are different forms of modernity, including those that do not consider the exhibited contrast of ancient-new as a value in itself, but are able to feel 'history as a friend' (e.g. architects such as Louis Khan, Hans Kohlhoff, Michael Hopkins (Figure 3), David Chipperfield (Figure 4), Guido Canali, Boris Podrecca, Giovanni Tortelli and Roberto Frassoni and, for their particular interest in urban fabrics and related morphological-type studies, Saverio Muratori, Gianfranco Caniggia, Aldo Rossi, Giuseppe Strappa) (Figure 5-6) [1-3].

In the mid 1950s, in the magazine "*Architettura. Cronache e storia*" [4], Leonardo Benevolo had already clearly stated, and rightly so, that conservation is always transformation and that the problem immediately translates into 'how' and what direction to take to transform. He explained that conserving, therefore, is not mummification; this is in line, for example, with the philosophical thought of Thomas Aquinas who believed 'conservation' is continuous 'creation'³.

It is therefore a question of knowing how to rise again from the ancient foundations and not building on what is not there (Figure 7).



Figure 3. Norwich, England (UK), cathedral complex, reintegration of two wings of the cloister, 2004-09 (Hopkins Architects).



Figure 4. Neues Museum (1841-59) (Berlin, Germany), the restored west front, with the great reconstruction-reintegration work on the left side, 2003-09 (architect: David Chipperfield).



Figure 5. Medina de Rioseco (Valladolid, Spain), church of Santa Cruz, restoration work of reintegration and completion, 1985-88 (Linazasoro & Sanchez Arquitectura).



Figure 6. Troyes (France). Administrative and congress center in the historical part of the city: the modern building body (centre) participates in a context of 'gothic houses' that had, in part, been in ruins for some time, 2008-14 (Linazasoro & Sanchez Arquitectura).



Figure 7. Milan (Italy), the Cloister of the Ghiacciaia, Hospital Maggiore alla Ca' Granda, restoration work, 1948-85 (architects Ambrogio Annoni, Piero Portaluppi, Liliana Grassi).

It is important to remember the concordant values of the ancient historical centers themselves which are not the simple sum of uncoordinated architectural episodes. The experience of the new Gibellina and the reconstruction of Longarone and Gemona have not been as positive as was hoped for. The restoration of Venzone with its cathedral and inhabited historical center, on the other hand, is a different matter (Figure 8) [5].



Figure 8. Venzone, Friuli-Venezia Giulia (Italy), the cathedral after completion of restoration work.

How can all this be communicated to a frightened population (who perhaps would like wooden Japanese or Tyrolean houses), how can they be convinced and how can a consensus be obtained to implement forward-looking proposals (without short-term

effects) because they are not only more attentive to resolving historical and memory-related issues, but also social and economic ones?

The first question that needs to be answered however, is whether or not there is a 'Western' anti-seismic culture and if so, whether it deals with the topic of using stone or brick masonry in construction [6-7].

It is clear that there are a series of questions and hypotheses which architects have to consider and which structural engineers, at least those who fully understand stratified and historically complex masonry, must give precise answers to: can a humble old wall of cut stone hit by an earthquake, be consolidated and kept upright and so be saved as a material fragment and effective sign of memory, or is it condemned *a priori* because it is evidently unreliable? This is where the complex issue of the relationship between seismic adaptation, improvement and local intervention arises and which is dealt with in the current Technical Standards for Construction⁴.

A final consideration regards the pitiful comparison made between the organization of the technical and administrative provisions following the earthquake of Friuli (1976), in contrast to that of Central Italy (2016). A regression of forty years (not technical but socio-political and legislative), in my opinion, of growing fear and increasingly obsessive controls, bureaucratization, fractionation, legislative bulimia and deleterious overlapping of responsibilities and of decision-making powers. Above all, there tends to be an inquisitorial scrutiny of individuals, especially professionals, without the state assuming, as it should do, the responsibility for precise well-defined choices⁵[8].

Other problems include the poor aptitude for selecting professional skills and businesses. The value of medium and small-sized companies with solid family traditions in central Italy (Marche, Umbria, Abruzzo and in Teramo species, etc.), is deliberately put aside in favor of substantially less suitable financial giants that are often boxes with no technical skills, but full of legal-administrative skills.

It is similar to what happens in selective competitions in the field of architecture, where the overall turnover of the participants and the discount on professional fees count more than verifying their real skills in project design. Finally, three possible scenarios present themselves relating to reconstruction after having made the necessary comparisons: the first is represented by the French city of Le Havre in France, which was heavily bombed during the Second World War and recreated *ex novo* (its design was based on a project by the architect Auguste Perret; a similar case in Italy is the rather disappointing case of Avezzano [9], to which can be added that of Gibellina)⁶. Another case is that of Cologne in Germany, which was carefully preserved and restored, thinking each step through and evaluating it district by district, assessing the damage suffered and also by listening to citizens' opinions. The last is the case of Beirut in Lebanon, devastated by bombs, but even more so by its unrestrained speculative reconstruction: as the journalist Marie Zawiska wrote in "*Le Monde*" a true "*ruée vers l'or*", a new 'gold rush'. Today, for example, in the case of Aleppo, in Syria, they are reflecting on these problems, while in Italy, the home of restoration, it is still not clear what road will be taken and much is left to local authorities. In recent decades however, they have been, for the most part, incapable of dealing with problems of such magnitude, when not guilty of the disorganized development of their cities due to tolerated unauthorized construction that has done nothing to decrease the damage caused by the earthquake. Many reasons exist to give thought for serious concern.

It can be said that, on the fundamental theme of prevention, things are somewhat behind, if not almost at a standstill. A healthy, broad process of light maintenance,

could at least be initiated, based on a sequence of well thought out programmed local interventions. It would be necessary to renounce the too easy rhetoric of 'everything now', of total safety and security (impossible), which is all too often publicized by political representatives; instead, for reasons of practicality and greater effectiveness, the aim should be to distribute the always limited (though not too modest) resources among a more widespread and more 'sustainable' range of interventions. Several studies have shown that a few local interventions are sufficient to greatly improve the seismic response of a building and therefore its safety. Going beyond a certain limit only serves to heavily increase the costs, but not the much sought-after safety, by reducing the number of possible widespread interventions and therefore, doing a disservice to the community.

2. On the reconstruction of the recently damaged historic centers

Several preliminary operations need to be carried out before starting reconstruction work. The operations should be of a conservative nature and be implemented urgently (not always the case today); soon after, they should include those of a cognitive, socio-economic nature and be directly technical-operative. The fundamental theme of prevention must also be remembered.

2.1. Urgent conservative operations

Once the movable works of art have been made safe, the task of protecting the residual frescoed or decorated walls (stuccos, marbles, wooden panels) of churches, convents, stately homes, etc. from atmospheric agents must be tackled. This is done in certain cases by means of well-secured sheets, in others, with appropriate but more stable covering, according to arrangements agreed upon beforehand with the artwork restorers on a case by case basis. The next step is to make safe any buildings that survived the recent devastating quakes at the end of 2016 and early 2017.

A fundamental question, however, which is taking a turn for the worse, due to a series of cultural (or rather 'non-cultural', owing to widespread disinterest in the matter), normative and economic issues, is that of the possibly orderly removal of the rubble, respecting the original surviving walls, which have also been seriously damaged. This was, moreover, debris for which the Ministry of Cultural Heritage and Activities and Tourism (MiBACT), with the help of the Institute for Conservation and Restoration (IsCR), had given very clear indications. They included a rapid selection of the collapsed materials to be classified according to their importance and the method of their disposal, which took into account the original position of the pieces considered to be of historical-architectural value or that were considered significant and could be reused in the reconstruction phase (Figure 9).

Unfortunately, things are not happening as planned, due to the mentioned lack of interest and non-recognition of the value by the local administrations responsible for the operations and also due to the economic interest of the demolition companies to proceed rapidly and, therefore, use improper means to flatten areas without giving much thought to what remains of the old historic centers.

2.2. Reconnaissance survey and preliminary exploration

A confused and hasty collection of rubble, accompanied by the demolition of the surviving walls, contributes to the definitive loss of values of collective memory and simple 'material culture', besides bringing about a devaluation in the testimonial significance of urban fabrics and facilitating the abandonment of traditional techniques.

Ordinance no.391 of 1 September 2016 contains provisions regarding the collection and transport of material resulting from the partial or total collapse of buildings. Article 28 of Decree Law no.189 of 2016, converted into law no. 229/2016, entrusts the extraordinary commissioner with the task of preparing and approving the plan for the management of rubble and waste deriving from the first emergency and reconstruction operations and ensuring the possibility of recovering the original historical-cultural matrices of collapsed buildings⁸.



Figure 9. Campi di Sotto, Norcia (Perugia, Italy) church of San Salvatore (12th-15th centuries) after the earthquake in 2016: IsCR technicians at work on the methodical recovery and cataloging of architectural and pictorial fragments.

Among the reconnaissance operations is the task of studying the disaster in all its physical complexity (nature of the generation and propagation of the most important shocks) and, based on the reading of the collapsed buildings and analysis of the surviving buildings, provide an outline of the essential points for future intervention. Next, all the necessary and useful information must be collected for the drafting of a reconstruction plan: maps, technical data sheets, vintage photos that must necessarily be pre-earthquake, drawings, etc. Finally, an overall interdisciplinary vision of the problem is needed, in order to develop urban planning and architectural guidelines for each inhabited center, including minor ones, that can effectively guide individual interven-

tions from a conservative point of view and ensure all the necessary guarantees for future safety.

2.3. Socio-economic operations and procedures

These procedures involve rapid or even temporary interventions in all the 'red zones' (those most seriously affected) considered to be useful for reactivating social activities as soon as possible and preserving a sort of 'normality' in traditional urban spaces and functions [10]. This is to avoid any progressive disaffection towards the ancient damaged historical centers, as has already happened in previous cases.

It is a question of stimulating the maximum collaboration and participation of institutions, citizens and associations, to identify the strategies to be adopted, communicate intents and listen directly to the citizens. This will support a process of identity which can be useful in limiting the tendency to abandon and to prevent the aforementioned disaffection for one's own village, city or territory. Focus must then be directed toward a process of reconstruction based on the identification, repair, recovery and restoration of what has been saved from the earthquake, also in terms of urban imprint (squares, road plans, housing typologies, etc.), avoiding its complete demolition and subsequent reconstruction *ex novo* and risking the further definitive loss of elements testifying to the past and memory.

Lastly, reconstruction planning and works direction should be put in the hands of professionals with the necessary specialized, historical, technical and methodological skills; that of the material reconstruction should be given to artisan firms, if possible, preferably local, traditional family-run businesses or small cooperatives. This is especially important for the historical fabric, while for the more challenging monuments, specialist firms should be used, as the Superintendencies already do.

Procedures should favor small artisan businesses, perhaps inviting them to work together; this would consequently mean publishing calls for tenders which take into account qualitative factors, such as real skills and operational capabilities, rather than other, merely quantitative factors such as turnover, number of employees, etc. It would in fact be opportune to support local companies, provided they are competent in repairs, maintenance and restoration, so as to immediately reactivate the production circuit. Subsequently, expert professionals specialized in the field of architectural restoration / rehabilitation and wall structures, should be selected using eminently qualitative criteria. Unfortunately, current laws and regulations are complex and tasks, when merely bureaucratic, need to be simplified to enable offices and responsible bodies to make rapid use of their technical skills and so act more effectively. These tasks, in fact, slowed down the indispensable work of implementing safety measures between the quakes of August and those of October 2016. A conscious legal approach is therefore strongly recommended to give certainty and substance to administrative forms of reconstruction, as mentioned above, ranging from calls for tenders for architects, engineers, surveyors, etc. to contracts for selecting companies, always specifying the level of safety required in each individual case and without burdening only the professionals with the workload.

2.4. Architecture and engineering - technical-operative actions

The replacement or radical renewal of buildings or the displacement of populated centers to different locations must in no way be encouraged: there have already been a sufficient number of negative experiences from Sicily to Abruzzo, from Campania to Veneto and Umbria itself. What is needed is to reconstruct the site safely and aim to make real 'anti-seismic improvements' that can integrate indispensable safety measures into the surviving ancient structures, reusing and increasing their capacity for resistance.

Contrary to what has been read in the newspapers in recent months, the 'improvement' (moreover, expressly mentioned in Legislative Decree 42/2004 in the Code of Cultural Heritage and Landscape) is not, compared to 'seismic retrofitting', a practice that is restrictive, less reliable or a way to cut costs - it is a scientific modality which is equally, if not more valid, precisely because you are dealing with structures of ancient masonry. It is a practice that requires specific knowledge of the structures, their nature, their history, their behavior in the event of an earthquake. This does not exclude the fact that the theme of 'improvement', understood as an essential underlying principle, cannot be articulated in such a way that its application takes into account the severity of the expected seismic action (as builders in the past have always done) and the particular initial condition ('vulnerability') of the artefacts.

'Seismic retrofitting' or 'adaptation' (i.e. full compliance with current regulations for new buildings) may instead involve completely new rebuilding, ideally relating to recent buildings found at the edge of historic centers.

Technical standards for construction in the decree issued by the Ministry of Infrastructures and Transport of 14 January 2008 make provision for assets of cultural interest in areas declared to be at risk of earthquakes, pursuant to paragraph 4 of Art. 29 of the Code of cultural heritage and landscape, to have limited improvements made by first assessing their relative safety. It should nevertheless not only cover 'listed' buildings, which represent a small part of the heritage, but include the historical fabrics and built environments, whose cultural significance is certainly of scenic value but at the same time historical, documentary, social and anthropological.

When buildings are no longer recoverable, in certain cases, it would be worth considering the possibility of perpetuating the testimony of the seismic event by leaving a space free of constructions or maintaining a given element in its ruined state. However, they are exceptional circumstances which require extensive cooperation and careful urban planning.

During the process of reconstruction, to ensure the effective overall recovery of 'life' within the severely damaged historical centers, it will be necessary to identify and favor some preferential lines to regenerate the urban fabric. This will keep the ancient heart of such centers alive and prevent them from being abandoned. This will be to the advantage of the peripheral areas, which are more easily accessible and repairable, but evidently less qualified. The town of L'Aquila runs this risk, as today it is differentiated by a horrendous periphery which is dynamic and a valuable historical center that still has an air of not being lived-in, despite the many timely works of restoration that have been carried out.

As experienced elsewhere, insufficient progress has been made, because it is based on a delimitation of areas, sectors or 'aggregates' dictated exclusively by road or property constraints, which are perhaps only useful to quantify the funding to be

provided to individuals. In essence, what is ultimately needed is a strategy of architectural reconstruction linked to a more general and unified urban vision of the problem.

In addition to the individual 'monuments', public buildings, churches and palaces, adequate attention must be paid, as mentioned, to the widespread heritage which also represents a value that is public, social, symbolic, memory-related and naturally linked to the landscape.

It is a question of reconstructing and trying to retain as much as possible of the old surviving 'material traces'. It will be necessary to plan with awareness and culture-consciousness of a morphological type, re-proposing buildings that will in some cases be ancient throughout, even if restored and satisfying safety standards; in others there will be an intelligent and respectful new union of old and new; other buildings will be modern, yet mindful of ancient urban, volumetric and spatial, structural, material and chromatic values.

The fundamental issue lies in the architectural and urban relationship one wishes to establish between pre-existing (despite being mutilated and fragmentary) and new interventions. These can be graded within a range of restoration work that can be real and proper, more or less reintegrative, and various other forms of reconstruction, oscillating between the presumed 'how it was and where it was' and more current methods of reinterpretation.

At an urbanistic level, morphological-type reference studies, more than others, are able to grasp the law of growth and transformation (not pathological but fittingly 'organic') of the old inhabited centers and so maintain its quality and identity even when numerous new architectural elements are added (relationship between solids and voids, plastic and masonry values, social spaces, neighborhood values, urban profile and setting within the landscape, etc.) (Figure 10).

The experiences of delocalization and ideologically 'modernist' reconstruction, as in the case of Gibellina in Belice (Sicily, Italy - mentioned earlier), have proved to be unsuccessful. In fact, a 'creativity' lacking any kind of critical sense was deliberately implemented which also bore no relation to what the history of the place itself suggested.

A safe and reliable way to deal with damage that has touched delicate old centers still has to be found; it is therefore essential to identify the best solutions from among the architectural and urban experiences that are apparently different, but all focused on the common theme of '*costruire nel costruito*' (building inside what is built) and to evaluate them one by one.

Some situations, as in the case of cities that have almost been completely destroyed (possibly Amatrice and Pescara del Tronto, which is steadily sliding downhill, but not Norcia and Cascia), require preliminary socio-economic considerations to be brought into play to determine whether to operate using a predominantly 'historical' and 'conservative' approach or a 'radical' one of planning and starting anew. This is especially true of the centers that already had a shrinking population before the earthquake. The question is how to make the inhabitants stay in these places? How much importance is given to discussions on 'economic structure' and the values of memory? Or better, how can the two mutually benefit each other?

Programming the interventions involves adopting a plan for public works and a plan for cultural heritage aimed at quantifying the damage in the four regions affected by the earthquakes and allocating the funds.



Figure 10. Santa-Cruz de la Serós (Spain), new earthquake-resistant houses, inserted to complete the historical built environment (architect: Carlos Labarta Aizpún).

As regards the planning and reconstruction phase for the cultural heritage or public works, paragraph 9 of the Ministry (MiBACT) directive 23 April 2015 (Official Gazette No.169 of 23 July 2015) provides for the stipulation of a memorandum of understanding between the extraordinary commissioner, the MiBACT and the representative of the dioceses involved, since they own the ecclesiastical heritage, in order to define forms of consultation and collaboration to carry out the interventions and, in particular, to decide on priorities, methods and terms for the recovery of the damaged assets.

An important role is reserved for the Regions, through the special offices for reconstruction and for the MiBACT. Provisions in paragraph 2, furthermore, allow the dioceses to perform the function of implementing bodies when the interventions are fully financed with their own resources. In the case of public funds, the MiBACT acts as an implementing body. It also regulates the procedure for carrying out initial interventions needed to prevent damage to cultural and landscape assets, as well as that for approving any subsequent interventions. By immediately informing the MiBACT of essential interventions, it enables interested municipalities to carry out work, such as safety measures for buildings, to avoid further damage to the cultural and landscape assets within their territories, as applied under Articles 27 and 149 of the Code of Cultural Heritage and Landscape, also by derogation of the procedures concerning landscaping authorization, as provided for by Art.146.

In the list of interventions not subject to landscaping authorization, Art.149 includes those “works for ordinary and extraordinary maintenance, of consolidation and of restoration for purposes of conservation which do not alter the condition of the sites and the exterior appearance of the buildings”.

Based on the new regulations which determine those interventions to exclude from landscaping authorization, it is important to consider interventions that fall within the category of free construction (i.e. that need minimal planning permission). These include the “faithful reconstruction of buildings and artefacts which, as a consequence of natural disasters or catastrophes, have totally or partially collapsed or been demolished, or are subject to demolition order due to the risk of collapse, provided it is possible to ascertain its consistency and configuration”.

Once again it is clear to see how these complex procedures are intended to defend, under the aegis of the MiBACT and its Superintendencies, individual listed assets but not their ancient social fabrics. The latter remain essentially in the hands of mayors who, together with their related municipal offices, are unprepared and unequipped to do the task, with the first negative results that have already become clearly evident.

3. Preventive measures and remedial action

When speaking of ‘prevention’ it can be said that the best precaution against earthquake hazards (as well as decay which, even though due to natural causes, progresses slowly over time), is the continued good care and maintenance of the building [11]. Maintenance (better if implemented in the form of “programmed conservation”) is capable of greatly attenuating the effects of an earthquake and decisively improving the response of the building as a whole. An example is the high level of damage in Belice and Irpinia, where the old built heritage had altered over time, as well as not having been very well maintained. Hence the importance of documents such as the Risk Map (ISCR - *Istituto Superiore per la Conservazione ed il Restauro*) or the various forms of ‘clinical records’ (similar to condition reports) developed by the CNR (National Research Council) for monuments.

Poorly maintained buildings can be likened to a clinically and genetically weakened population facing an epidemic. More than five hundred years ago, it was precisely what humanists and writers of treatises on architecture, such as Leon Battista Alberti and Filarete wrote, likening a “horse that does not eat” to a weakened architectural organism.

Unfortunately, only a very small portion of public and political wealth is reserved for ‘maintenance’ and ‘prevention’ and hardly goes beyond a few polite words of circumstance, since they are two ‘humble’ tasks which do not give visibility. Besides, spending today, to see it bear fruit in a more or less distant future does not appeal to many leaders. Nor is a moderate ‘improvement’, compared to the more substantial (and expensive) ‘seismic upgrading’ greatly favored; just as in the case of the ‘timid restoration’, the architect Marco Ermentini refers to in his writing [12]. In some instances, not even simple ‘repair work’ is well thought of, compared to more consistent and conspicuous ‘reconstruction work’.

In brief, as Leo Longanesi ironically stated, ‘Italian politicians much prefer inaugurations to works of maintenance’.

The particular nature of L’Aquila’s architecture, which has continuously regenerated

itself following the damage caused by frequent earthquakes, poses precise problems concerning design and operational choices, as well as considerations on what positive action has been taken in the past in terms of seismic prevention. One need only think of the effective traditional technical provisions, developed between the 14th and 18th centuries, of which Maurizio D'Antonio writes in his book *Ita terraemotus damna impedire* (cited later) [13]. Considering L'Aquila's context, one should also take into account the excellent results of the well-designed and well-accomplished maintenance and prevention work, executed before the earthquake of 2009, on monuments such as the former convent of San Domenico, the roof of the central nave of the basilica of Santa Maria di Collemaggio, the Romanesque church of San Pietro Apostolo in the suburban center of Coppito, which, in the devastated landscape of the city and its surroundings, remained substantially intact after the earthquake. From these examples one can well understand the importance of planning and timely intervention. Not any kind of intervention however, considering the many previous cases that have actually caused damage. It must be implemented using a rigorously historical-technical methodological approach and relevant culture, that is equally respectful of 'conservation' principles as well as those of 'safety' and seeking a possible, complete accord. It is no coincidence then that the three examples mentioned above are the work of people working in public administration and university education who, alongside their professional practice, have cultivated historical and technical studies and made an in-depth scientific study of seismic issues.

Reading the book by Maurizio D'Antonio, who was the architect responsible for the intervention in San Domenico, one is noticeably struck by the accuracy of the restoration in terms of a "thorough, meticulous and highly documented survey". The book likewise refers to documentary research where "structures exposed by the earthquake, allow us to re-read and 'rediscover' the anti-seismic techniques of past centuries" and can be read in a historical-evolutionary key, with special attention paid to the innovation and 'scientificity' in the approach to the subject of earthquakes, in the eighteenth century, "with particular reference to the south of Italy and Abruzzo", but which can naturally be extended to the whole country.

D'Antonio's work is not a study that is an end in itself, nor is it a scholarly study. It poses concrete and extremely topical questions, which can be summarized as follows:

- can we be sure that the 'very modern' and 'technologically advanced' anti-seismic solutions being applied today in the 'recovery' of historic buildings in general, in Abruzzo, in Emilia Romagna and shortly to be applied in central Italy, are the best possible ones?
- can we learn from the anti-seismic technologies adopted in the past (in short, learn from history as well as science), especially since they have proven their effectiveness? In L'Aquila, it is certainly no accident that the generalized collapse of buildings did not happen and that many buildings survived the earthquake of 2009 and previously that of 1703.

D'Antonio writes, from the study "emerges a picture of unsuspected skills and methodologies, to be regarded with respect and attention, and whose recovery seems to be an unavoidable path to follow for the philologically correct anti-seismic restoration of historical buildings".

In this context, the relationship between 'science' and 'practice' must be seriously reflected upon since, according to Leonardo da Vinci's line of thought, one has need of the other and vice versa. Thinking carefully about the construction and the importance

of maintenance, as was mentioned initially, must also not be neglected. Hence the need to invest in “long-term safety” rather than thinking of “immediate profit” (Lewis Mumford) and should be seen from the perspective of real interest in “collective well-being”.

Earlier, the presumed incompatibility between safety and conservation was remarked on, both evidently being priority needs. Today, this incompatibility is amply underlined by the mass media, as demonstrated by the recurrent press and television attacks against the concept of seismic ‘improvement’, a concept which is, moreover, greatly misunderstood. It has, however, compared to the past, greatly diminished or possibly even ended, thanks to a modern historical approach to techniques, as taught by three great protagonists of research on masonry structures and their behavior: Edoardo Benvenuto, Salvatore Di Pasquale and Antonino Giuffrè.

This approach leads us to consider the consolidation and ‘improvement’ (not ‘adaptation’) of a masonry structure as an integral part of restoration and its guiding principles, as other scholars, principally of a non-technical disciplinary background, such as Renato Bonelli [14] and Salvatore Boscarino [15], several years earlier, had already intuitively realized and recommended. Restoration, therefore, designed on the basis of preserving the historical and formal values of the building, but realized, using mainly traditional materials and processes, “as a technically correct and intelligent method to restore conditions of safety and structural efficiency satisfactorily” (a consideration by Giorgio Croci on the restoration of the Basilica of San Francesco in Assisi).

This, unfortunately, does not mean that in practice things go well. In general, they turn out to be far from satisfactory, often due to a lack of historical-technical knowledge, “dissociation, and at times, opposition, between the figure of the structural engineer and the architect who is experienced in historical buildings”, in addition to laziness and conservative professionalism.

Records of all the ancient anti-seismic provisions, briefly mentioned above, are truly wide-ranging: masonry ‘rooting’, hooping, chains, anti-ejection tie-rods, staked trusses, buttresses and abutments, scarp walls, overhead arches, joints and interspaces, vaults and light partitions, frame structures and ‘*barracata*’ structures (the latter referring to 19th century earthquake-proof buildings), due care given to the building design (bilateral symmetry, low center of gravity, modest elevation), quality of the masonry. What is recommended above all is to lighten the upward masses and use good quality bonding for the walls.

D’Antonio rightly writes that we are “only just starting to discover the world of unsuspected anti-seismic knowledge of our ancestors” and that we must therefore continue to look and learn, also by taking advantage of the opportunities for real analysis offered today by the work sites where buildings hit by earthquakes are being restored. Instead, in many cases, drawing from the various earthquakes that followed one after another, “they have proceeded to demolish buildings and entire blocks” in the historic centers (the alarm was recently launched by the then Regional Secretary for Cultural Heritage and Landscape from MiBACT, Stefano Gizzi (an architect) in relation to the demolition in Campotosto, in Abruzzo) “wiping out a part of its history and civic identity. Greater planning effort could have saved” many ancient testimonies, walls rich in history and memories, elements essential for maintaining the identity and vitality of these places.

But the most dangerous and widespread message was that “the reconstruction” could be conducted “without any preliminary historical analysis and without knowing the history of the territory, the city and the individual buildings. The message that the

restoration and structural consolidation could be planned and executed without knowing the historical evolution of the architectural structure has spread. Nothing could be more wrong. A correct intervention, both on an urban scale and on individual buildings, cannot be separated from history”, as the same guidelines from MiBACT for reducing seismic risk, clearly state [16].

4. Conclusion

For reconstruction work to be successful it is essential to be able to count on project planning that can enhance all the possible architectural remains which are actual ‘documents’ that preserve the memory of what has disappeared. This will avoid the total rebuilding of structures that are divorced from history or, on the contrary, that are purely theatrical copies: a sort of fake “musealization” that risks compromising both the urban identity as well as the cultural and social identity of the territory.

There is, furthermore, a certain division between architecture and urban planning which is to be deplored, as it currently prevents the two disciplines from helping each other, with urban planning guiding the entire reconstruction (from the basic elements, defining alignments, volumes, colors, type of openings and coverings, to the fundamental relationship with the surrounding landscape). This division can also be noted in the relationship between conservation and structural consolidation, that is, between conservation and safety, two terms that, at first glance, seem to act in opposite irreconcilable directions. In the wake of an excellent tradition of consolidated studies, this presumed contrast could be integrated into one organic unified operating mode of authentic and complete ‘restoration’, as well as into a widespread practice of ‘maintenance’ and ‘prevention’ of an eminently conservative nature. Thus, thanks to conscious, compatible, reasoned and interdisciplinary planning, it should bring together the two sides, the historical-humanistic one (which provides the reasons for ‘what’ to conserve and ‘why’) and the scientific-technical one (which gives the reasons for ‘how’ to preserve), both related to the problem of protecting and preserving architectural cultural heritage.

The collapse and instability of recent buildings seem to offer a chance to redeem areas compromised by poor urban planning and unauthorized constructions (but also those marked by the occasional addition of invasive reinforced concrete structures within the delicate and fragile aggregates of the ancient center). That is, if the new planning is able to establish an effective and attentive dialogue with all those features of historical architecture (type, spatial relationship, solids and voids, figurative solutions, colors, materials, etc.) that made the villages affected by the earthquake among the most harmonious in central Italy.

The easily understandable wish to proceed quickly for the population to return to normal everyday conditions, must be tempered by the need to ensure the quality and the right methods of intervention both in the planning and executive phases. This means rejecting the temptation to adopt standardized and apparently resolute technical solutions, considering, on the contrary, the peculiar constructive identity of the buildings, the specificity of the problems they present and the possibility of developing, on a case by case basis, the least invasive and the most appropriate solutions.

The high level of specialization involved in restoration work should not allow shortcuts or leave room for impromptu initiatives, that perhaps come with ‘advantageous’ offers of economic savings or permit unqualified personnel to be involved in the con-

struction site. Indeed, Central Italy boasts a number of reliable architectural restoration companies of great value thanks to their familiarity with solid traditions, their medium size and their 'artisan' characteristics which are also linked to the care and maintenance of a skilled workforce. However, as mentioned earlier, the calls for tenders for assigning works often seem to have been conceived and written in favor of large enterprises of an "industrial" type which are influentially and economically richer, rather than possessing the necessary specialized skills.

M. Alessandra Vittorini, an architect and the Superintendent of Archeology, Fine Arts and Landscape for the city of L'Aquila and the 'crater municipalities' (crater is the term used to define the perimeter of the areas most affected by the earthquake), recently drew attention to the worrying reduction in the guarantees and instruments to protect "the landscape and the historical built fabric, inside and outside the 'seismic craters'" as a result of "the 'simplification decree' (DPR 31/2017), which definitively removed from any preliminary assessment, all interventions of so-called 'faithful reconstruction' after natural disasters – considered to be interventions of 'minimal importance' – which are, evidently, not at all minimal with respect to the context" [17].

On the contrary, acknowledgement of MiBACT's investigative or at least advisory role regarding urban planning and the entire process of reconstruction, including 'un-listed' heritage, should be guaranteed, not merely for the sake of conservation but to see, as far as it is possible, the old centers come alive again and fully repossess the identity that has been so shaken by the three earthquakes. The Ministry should be seen as a proactive and collaborative reality, not coercive, and essentially be scientifically and methodologically qualified, acting as an 'accompaniment' to the process of reconstruction.

As stated earlier, it is important to implement a stable participatory process, that is open to citizens first of all, to identify the most appropriate strategies. This should encourage methods of intervention that are strongly based on the repair and restoration of the damaged but surviving architecture and on the preservation and perpetuation of the urban layout and public spaces (Figure 11), excluding complete demolition and subsequent reconstruction.

The substitution or radical renewal of the buildings and in particular the displacement of inhabited centers to other locations are to be avoided: there are already sufficient negative experiences to evidence this.

Once the problem has been properly contextualized in general terms, it will be easier to repair the individual 'monuments', public buildings and churches, and even the widespread private heritage which also represents a public, social and symbolic value, as well as mnemonic and sentimental, and naturally landscape. This constitutes the first, significant image of how an ancient center presents itself to those who come from outside or pass through it.



Figure 11. Vinaroz, Castellón, Spain (city in the Comunidad Valenciana): recovery of the ruins of the convent of San Francisco (seventeenth century), demolished in recent years by order of the municipal administration and transformed into a garden and a small urban square (architects: Fernando Vegas López-Manzanares and Camilla Mileto).

Finally, rebuilding “how it was and where it was” is an affirmation that is certainly suggestive but has some element of ambiguity. On the ‘where it was’ can be immediately agreed upon, as can be well understood from what has been said. The concept of ‘how it was’ can be seen from different viewpoints, from the so-called ‘philological’ reconstruction to the purely theatrical and iconic: the first is impossible, considering the profound and irreversible changes that have occurred in manual skills, organization of the work area, the nature and quality of the materials, technical equipment, basic living conditions, laws and regulations, economics, etc., during the last century; the second is incomplete due to the fact that it is limited to preserving solely external forms, neglecting the interiors and sacrificing the typological aspects which, however, are an integral and essential part of the architecture.

A fundamental premise is the need to understand and re-establish (using all relevant existing graphics and photographic information) the consistency of the architectural volumes prior to the earthquake, their relationship with the empty spaces (squares and streets, fundamental places for socializing), the urban profile within the context of the surrounding landscape. The possibility of removing any unauthorized constructions or improper building bodies must be considered; reconstructing trying to maintain, as much as possible, any old surviving ‘material traces’. These can well become part of a renewed architectural reality, but not be oblivious to its traditional urban and landscape values. An architecture to be thought of as a piece of ‘craftsmanship’, as stated previously in relation to those companies that should be called upon to operate, and to be developed ‘on site’, in terms of listening and paying attention to local suggestions.

A recent invitation to two days of study on the topic *Minor Centers-Enjeux majeurs*.

Revitalization des petites villes, expérience en France et en Italie, organized by the *Ecole Nationale Supérieure d'Architecture de Clermont-Ferrand* and the Polytechnic of Turin (12 and 13 April 2018), on a proposal by Nicolas Detry, with special attention to the “secteur sauvegardé de Thiers”, a small town of pre-Roman origins in the department of Puy-de-Dôme, clearly states that the architectural and urban quality typical of small historic cities is, in essence, “une forme de biodiversité” worthy of protection. This, firstly, through effective programs of revitalization that are able to adequately address the problems of these situations that are fragile, often degraded and poorly studied, because they are constituted by ‘simple’ buildings, by poor “types formels et constructifs locaux” and not necessarily by “Monuments historiques reconnus et soutenus”.

This is the conclusion, which is also an appeal: “L’Europe des petites villes n’est donc pas seulement un enjeu patrimonial énorme, c’est aussi un enjeu social, écologique et politique. Dans leur complexité, les opérations de revitalization des petites villes, concentrative quantité de questions actuelles” and not only ‘ultra-conservative whims’ as some would have us believe, with regard to those small centers in central Italy hit by the earthquakes [18].

Notes

¹ “All those assets referring to the history of civilization are part of the cultural heritage of the nation. Assets of archaeological, historical, artistic, environmental and landscape, archival and bibliographic interest, and any other material evidence testifying to the value of civilization, are subject to the law”, Titolo I, Dichiarazione I, *Relazione della Commissione d’indagine*, in *Per la salvezza dei beni culturali in Italia. Atti e documenti della Commissione d’indagine per la tutela e la valorizzazione del patrimonio storico, archeologico, artistico e del paesaggio*, Casa Editrice Colombo, Rome 1967, vol. I, p. 22.

² An example is that of Campotosto, Accumoli, Pescara del Tronto and Amatrice itself, which, after drafting excellent guidelines for the reconstruction of these hamlets (*Linee guida per la redazione dei Piani di Ricostruzione delle Frazioni*) at the end of 2016, they unfortunately remained on paper.

³ “*Conservatio est continua creatio*”: the concept, rich in specifically theological meaning, runs throughout the Christian school of thought, from Paul and Augustine on, to Thomas Aquinas and later.

⁴ Technical construction standards (*Norme Tecniche per la Costruzione – NTC*) for 2018 were published in the official bulletin (*Gazzetta Ufficiale*) of the Italian Republic on 20th February 2018 and came into effect the following 22nd March.

⁵ “Even today the failure to share a regulatory framework in place of the customary ordinances is clearly leading to growing institutional chaos from which it now seems impossible to escape. A ‘chaos’, unfortunately, where the rules no longer exist, or, when they do, they are incomprehensible and may be interpreted as desired. Procrastination of the emergency has led to legislative and administrative inertia. It is now evident that to overcome the management policy of the ordinances, specific regulatory provisions are needed. With respect to the disregarded time-frame of the emergency, it is therefore necessary to restore full operability to the ordinary public administrations, which must respond within a specified time - by law - to the urgency of rebuilding”, Maggi 2012, p.17.

⁶ The small medieval village of Chiavano, under the administrative council of Cascia in the province di Perugia, damaged by the earthquake of 1997, was not restored but abandoned and later relocated to a nearby site. Today, replaced by modern architecture and built with good intentions, it lacks any kind of urban planning and is unable to create an urban fabric that is at least comparable, in terms of quality, living standards and uniqueness to the old one, which was enriched by its ancient castle and parish church. The same could be said of many of the new post-earthquake constructions in Irpinia.

⁷ Procedures for the removal and recovery of the rubble of protected property and historic buildings developed by the *Istituto Superiore per la Conservazione ed il Restauro* (IsCR) and Directorate General for Archeology, Fine Arts and Landscape (DG ABAP) of the Italian Ministry of Cultural Heritage and Activities and Tourism, by the architects Gisella Capponi and Alessandra Marino and transmitted to the competent territorial offices on 12th August 2016 and signed by the ABAP Director General, Caterina Bon Valsassina, state:

“Previous experience of removing rubble from sites affected by seismic events enables the progressive refinement of procedures so that removal operations are more efficient and subsequent recovery interventions are more reliable.

For this purpose, two distinct methods must be identified, one for protected assets and another for historic buildings, within the following sequence of operations:

Acquisition of aerial photographic documentation using drones.

Photographs should indicate perimeter boundaries with defined zones that identify the three types of rubble:

a) rubble of protected assets (by both express provision and *ope legis* – legal measures)

b) rubble of historic masonry

c) rubble of modern buildings with no cultural interest.

Removal of c) type rubble must be done with the sole precaution of verifying if there is a mixing or intersecting with type a) or type b) rubble.

Prior to removal of type a) and type b) rubble, the following operations must be carried out:

- transposition to the rubble of the perimeters of the different types using stakes or other forms of identification in the field that are useful for defining a program for subsequent removal of the rubble;

- subdivision into geo-referenced quadrants of the photographic documentation to be further subdivided according to the size of the buildings, the density of the rubble and their stratification.

Removal of type b) rubble shall be carried out according to the following procedures: the rubble must be transported to places to be selected by the Region / Municipality. Its transport must take place in such a way as to allow the subsequent recovery of the largest possible amount of stone material, both of the masonry and of the door and window jambs and frames, cornices, shelves, fireplaces, any decorative elements, balconies, ceramics, handcrafted wood and metals, tiles etc., as well as the recovery of waste material which, properly treated, can constitute an inert basis for future reconstruction. Sorting will take place at the collection sites under the supervision of MiBACT technical staff. For this purpose, it is necessary, as far as possible, to associate the material with its original location and allow its traceability. The cadastral mapping can be reported on the geo-referenced photos marked with grids to help future re-location

of the materials in the different housing units, also with a view to aiding identification by the population. In moving and stacking the selected material of type b), as much care as possible must be taken to associate the cumulus to the quadrant and the relevant lots of cadastral areas”.

Indications then follow, regarding the safeguard *in situ* or the methodical removal, according to the individual case, of the rubble of type a) under the supervision of Mi-BACT personnel.

⁸ This is what was done, with considerable anticipatory sensitivity in Irpinia almost forty years ago, for Sant'Angelo dei Lombardi, an old center of early medieval origin in the province of Avellino, where removal was not carried out using bulldozers, as happens today, but was deliberately done in a 'manual' way. It should also be noted that in Sant'Angelo, for example, contrary to what happened in Conza della Campania, a city of ancient origins also in the province of Avellino, the inhabitants opted not to 'relocate' their traditional urban area.

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Biographical notes

Giovanni Carbonara is Professor emeritus at the University of Rome "La Sapienza". Former director of the 'School of Specialization in Architectural and Landscape Heritage' and coordinator of the PhD in 'Conservation of architectural heritage' in the Faculty of Architecture of the same University. He has lectured on the Specialization Course for the Carabinieri specialised in the Protection of Artistic Heritage and the École de Chaillot-Cité de l'Architecture et du Patrimoine in Paris (France).

He has been a commissioner for CIMAE (Ministry of Foreign Affairs) for the construction and restoration of Italian embassies abroad; member of the Commission for the restoration of the facade of the Basilica of St. Peter's in the Vatican; consultant of the Lombardy Region for the restoration of the Pirelli skyscraper in Milan. He is a member of the Superior Council of MiBACT; member of the "Working Group for the development of methodological and technical guidelines for the reconstruction of cultural heritage damaged by the earthquake of 24 August 2016", consisting of MiBACT (2016-17) and the "Technical Committee of Commissioner Structure extraordinary government for the reconstruction in the territories of the Municipalities of the Regions of Abruzzo, Lazio, Marche and Umbria affected by the earthquake of 24 August 2016". Italian Gold Medal of Merit for Culture and Art (conferred by the President of the Republic, 2008).

His publications cover various issues relating to the principles and methods regarding the restoration and conservation of ancient and modern artifacts of historical-architectural-monumental interest.

Summary

To successfully reconstruct the towns in central Italy hit by a series of earthquakes in 2016-2017 means having access to high-quality specialist planning, capable of enhancing all possible architectural remains, testimonies of an ancient beauty relating to architecture and landscape, and documents able to preserve the memory of these places.

This would avoid re-constructing buildings that are completely divorced from historical reality or, on the contrary, purely theatrical: a sort of "musealization" created just for show that risks compromising the urban identity and the cultural and social identity of the territory.

For this reason, the presumed contrast between 'conservation' and 'safety' - two terms which seem, at first sight, to go irreconcilably in opposite directions - must be surmounted. In the wake of an excellent tradition of study in this field, such a contrast could be synthesized by reconfiguring them within the operative term of 'restoration' (it includes 'maintenance' and 'prevention' of an eminently conservative nature), which summarizes the two contrasting terms. On the one hand is the historical-humanistic area (which provides the reasons for 'what' to conserve and 'why') and on the other, the scientific-technical one (which gives the reasons for 'how' to conserve).

The will to proceed quickly is understandable but must, however, be tempered by the need to guarantee the right intervention methods both in the planning and in the execution phase. The temptation to adopt corrective technical solutions must be rejected and must, on the contrary, take into consideration the peculiar constructive identity of ancient buildings, the specific problems they present and duly seek the least invasive and most appropriate solutions case by case.

Riassunto

Per avere successo, l'opera di ricostruzione dei centri abitati dell'Italia centrale colpiti dalla sequenza sismica degli anni 2016-17 deve poter contare su una progettazione specialistica e di qualità. Questa deve essere in grado di valorizzare tutti i possibili resti architettonici, testimonianze di un'antica bellezza, anche paesaggistica, e documenti capaci di preservare la memoria dei luoghi. Ciò per evitare una riedificazione completamente avulsa dalla realtà storica o, al contrario, puramente scenografica: una sorta di "musealizzazione" di facciata che rischia ugualmente di compromettere l'identità urbana ed anche quella culturale e sociale del territorio.

Bisogna, per questo, superare il presunto contrasto fra 'conservazione' e 'sicurezza', due termini che, a prima vista, sembrano agire in direzioni contrapposte e inconciliabili. Sulla scia di un'ottima tradizione di studi in materia, tale contrasto può trovare la sua sintesi riconfluendo all'interno di un'organica e unitaria modalità operativa di 'restauro' (oltre che in una diffusa prassi 'manutentiva' e 'preventiva' di natura eminentemente conservativa) che riassume in sé i due versanti, quello storico-umanistico (che fornisce le ragioni di 'che cosa' e 'perché' conservare) e quello scientifico-tecnico (che dà le ragioni del 'come' conservare).

La ben comprensibile volontà di procedere in tempi rapidi dovrà, infine, essere temperata dalla necessità di garantire le giuste modalità d'intervento sia in fase progettuale sia esecutiva; ciò rigettando la tentazione di adottare soluzioni tecniche corrive, ma tenendo in considerazione, al contrario, la peculiare identità costruttiva degli antichi edifici, le specifiche problematiche da essi presentate e il dovere di ricercare, caso per caso, le soluzioni meno invasive e più appropriate.