DIMENSIONS OF PERFORMANCE AS A REVITALISATION STRATEGY FOR CASTELVECCCHIO CALVISIO

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Introduction
Earthquakes are still of the utmost concern, especially because collapsing buildings can cause the death of many people. We can wonder if the complex phenomenon of earthquakes is controllable. Is it possible to (re)design and restore buildings so that they can resist the power of earthquakes and so that they are no longer fatal to human beings? If we want to assess the risk of earthquakes in the future, knowledge of constructions and interventions that prove to be adequate is essential.

The Castelvecchio Calvisio settlement in the Italian province of L’Aquila is an important testament to how earlier builders gave an adequate answer to seismic-sensitive settlements. Castelvecchio Calvisio shows an interesting layout with unique local features, narrow streets with buildings that are connected by arches that improve horizontal strengthening, and external steps acting like buttresses. The identity of this site is determined by three overlapping factors: the characteristic features of the buildings and the urban fabric of the settlement that are a result of lessons learnt from previous earthquakes; the genius loci of the local context, and the individual and collective perception of the actors. For the revitalisation process to be successful, the interaction between these factors is essential.

Critical evaluation of the buildings ensures that the original structure is strong and able to give an adequate response to earthquakes. After the earthquake of 1461, at the end of the 15th century, the buildings were (re)constructed to prevent problems caused by earthquakes (Tertulliani et al 2009). Connections made of wooden ties with iron keys on the corner of the buildings show that the former builders knew the critical points of the structural system. In contrast, the interventions of 1915, making use of reinforced concrete, are sometimes very massive and are not always efficient in preventing damage from earthquakes.

The performance of the site as a whole, where the typical layout of urban tissue of the settlement consists of structural aggregates of 60m by 6m, together with the typology of the buildings themselves, resulted in the survival of the built fabric. Even the architectural details of the buildings have not been destroyed.

Observation on site reveals that the main structural problems derive from the consequent lack of maintenance. Investigation indicates that this village had already been abandoned before the earthquake. There is an additional demographic problem, because the younger generation has moved away from the area. This situation is closely interlinked with a lack of cultural and economic vitality in the area.

Aim and methodology
This study analyses the adaptive preservation and revitalisation strategy for the vulnerable settlement of Castelvecchio Calvisio so as to avoid losing the original concept. The
aim of a revitalisation project is not only to analyse the current state of the art but also
to stipulate a strategy for the future. The examination of the physical structures and their
components in relation to the damage of earthquakes must take into account three time
levels. The construction concepts and the structural and repair techniques, as represented
and, verified on site, must be fully understood in order to explain the phenomenon in the
present state and will result in finding new techniques or methods for future applications.

Sharing and transferring information about the architectural geometrical concept to-
gether with the material and structural seismic analysis leads to the right strategy for the
interventions that we can apply to this village. In addition, the reuse and revitalisation
strategy also responds to the different dimensions of sustainability and offers social eco-
nomic and political advantages (Yung and Chan 2012: 352).

Finally, researching and creating a pattern language for seismic solutions will give an
answer to the question: Mapping seismic cultural heritage areas, how can we use it and
how can we incorporate it into design?

On the one hand, this paper contributes to the increase of knowledge of seismic con-
figurations of heritage sites. On the other hand, the revitalisation strategy for the cultural
heritage site alters the current heritage discourse and may well become a catalyst in the
restoration of local identity, local economy, and social values. Examining dimensions of
performance will facilitate reflection on this strategy and can lead to the development of
best practices.

**Four dimensions of performance for a revitalisation strategy**

We can distinguish four dimensions of performance that can be useful in order to
develop a framework of criteria for the interventions and the sustainable development of
this vulnerable place. All these dimensions must be in correlation and in coherence with
the three scale levels: the context, the concept of the buildings and the construction of
the buildings.

These dimensions concern the following questions: Do we have to rebuild the ruined
parts of the site? If the quality of the buildings is not so high, can we add new elements?
How can we do this with seismic aspects in mind? Do we have to restore or reconstruct
the symbolic buildings like the church? Do all the houses have to be reused? How can a
revitalisation concept support the sustainable development of the site?

**Character**

The first dimension, ‘character’, refers to overall aspects that contribute to the aesthet-
ic experience of the site. These aspects must be respected because they support the
identity of the place and give the place its meaning. The Australian Burra Charter (2013)
emphasises that significance is “embodied in the place itself, its fabric, setting, use, asso-
ciations, meanings, records, related places and related objects”.

The whole site of Castelvecchio Calvisio can be considered as a monument in itself.
Considering the seismic strategy it is also important to know that the entire settlement is
working as a whole organism in which the different structural elements strictly interact
with each other. It is not possible to really understand this site from one component only –
the site needs to be understood as a totality. But likewise, it is not possible to understand
the whole without knowledge of all the different components.
**Congruence**

The second dimension, ‘congruence’, means that the structural interventions must be compatible with the use or re-use of the place. A reconversion and revitalisation concept with a long-term vision that promotes the requalification of the residential context according to its particular features and environmental quality is a must. This concept also has to guarantee the socio-economic improvement of the territory so that the former population will return to their house and that young people will be drawn to live here. The applied strategy for structural repairs depends on a function for the site. Three options for future sustainable development can be explored.

In accordance with John Ruskin’s ideas (1912), the first option refers to the preservation of the site as a ruin, a kind of archaeological site where the impact of the landscape will play an important role (Wheeler and Whiteley 1992). The primary objective is to preserve the fabric as it is found, to undertake the preservation without taking the historic fabric to pieces, or if this is unavoidable, to take down only the minimum amount of fabric needed to undertake the repair (Strike 1994: 126).

If we regard Castelvecchio Calvisio as an archaeological site that can be visited but that cannot be re-inhabited, it is probably sufficient to ensure the possibility of walking safely through a limited number of streets inside the historical centre, and of having access to a limited number of houses. This option is based on respect for the original building materials and the conservation of the life story of the settlement. The weathered stones bring about a sensation of the patina and an experience of history. In this concept the emotional and remembering values are emphasised. The site is preserved for its unique character but the buildings will no longer have an intrinsic functional value.

The second option addresses the adaptive re-use of the settlement for the living community. Within this option the houses will be permanently or temporarily used as dwellings. The return to the original function of the buildings is still relevant and desirable.

Here the safety demands are much more challenging in comparison to the first option. This option fits with the social dimension of sustainable development. This social dimension emphasises the social well-being of the users, the accessibility, the social and cultural value and the safety of the site (Van Dessel and Putzeys 2007). Moreover, for this re-use concept the comfort requirements, as explained in the comfort dimension described below, are essential.

This third option focuses on tourist purposes and cultural activities, such as an educational hub for studying seismic structures. Indeed, fieldwork is a very essential aspect in architectural education. The opportunity of working on a site like Castelvecchio Calvisio is extremely valuable. This opportunity will give an extra identity to the village and will attract young people who want to live and work in this area. Thus the quality of life will be strengthened and rejuvenated. But we must also be aware of the fact that cultural heritage is often coupled with the idea of recreation and tourism, in which lurks the ever-present risk that cultural planology will lead to ‘disneyfication’. “Tourism as a reason *in se* creates a one-sided approach to the cultural heritage. In contrast, tourism as a partner and co-visitor protects the cultural heritage against its being consumed as a mere market product. Sustainable tourism can only evolve if it can generate tangible benefits and advantages for the local community” (Leus and De Naeyer 2011: 124).

The design task differs in the three cases and can lead to rather diverse technical choices.

The combination of the three re-use proposals seems to be the best strategy. The analyses reveal that there is need for a holistic approach whereby landscape, heritage, the
economy, and tourism can be approached in an integrated way. The introduction of new functions can bring new life into this area and the host community will be involved in the touristic management of the site. This will also increase employment of the local people.

Finding an adaptive revitalisation strategy is not only an urban, architectural or technical problem, but also a social necessity. The approach must be appropriate for the specific context, the character and the history of the place, so that it creates a broader social basis. Moreover, the management of this settlement must be prepared to get local residents involved in a participatory process in which close cooperation is a central issue.

Comfort

The third dimension, comfort, is explicitly related to perception and preference. The physical surroundings of a place play an important role in the choice by people to use these settlements, and it will influence their affective response to these places (Leus et al 2013). The characteristic urban layout of the village with its medieval buildings creates a particular atmosphere of silence and recovery and it functions as an oasis in the landscape, a quiet place that must be preserved. Quiet areas are areas in the margin. We can associate them with the layout of a written page, in which a white space surrounds the text. Situated in the margin of the urban landscape, these are special places in which to organise things, to live, to breathe (Leus 2010).

Comfort is also related to sustainability. But comfort in historical buildings differs from the comfort requirements of new buildings. The cultural values are more important than complying with the European environmental legislation on energy saving. Sustainability is often narrowed down to ecological aspects, and especially for built cultural heritage it mostly covers energy efficiency. The structural requirements that improve the quality and quantity of connections between buildings can also be considered as an architectural and functional requirement. Joining the houses together to create more space to make them more comfortable can also overcome some of the most critical drawbacks of the present state, such as the problems related to air, light and so on.

Comfort is also linked with the physical accessibility of the site. A complete fulfilment of the code standards in terms of accessibility cannot be realised without harming the typical heritage values, the capabilities of the buildings and the urban tissue. Adjustments that are too drastic will damage the representative properties.

Control

The fourth dimension, control, focuses on the financial management and the safety of the site. This issue is linked to the economic aspect of sustainable development and primarily refers to return on investment. Donovan Rypkema (2006: 38) emphasises that conservation in many cases is economically profitable. Although the balance between minimal intervention and maximal functionality is difficult and fragile, on-site research reveals that the renovation of this village is economically feasible. The identification of the economic potential of the site and the region in relation to local employment needs to be developed in more detail. Economic embedding, or the economic attractiveness of the site in a broader context, can be increased by the revitalisation strategy as mentioned in the second dimension, congruence. Re-use options must reflect how the place will function in relation to the wider economy, so costs need to be minimised. The reconstruction plans for this site have to suggest provisional and definitive interventions for reconstruc-
tions and for seismic vulnerability reduction, and must address a good balance between costs and benefits. The use of modern techniques like titanium and carbon fibres is not lucrative and not necessary in this case.

Public safety plays an important role in the attractiveness of the site. Referring to the hierarchy of walking needs of the neighbourhood, as defined by Alfonzo (2005), safety is an important condition for improving the well-being of a neighbourhood. Physical and social safety mutually reinforce each other (Luten 2008). Communication and education have an important role to play in this respect. All the actors have to be involved in the safety management of the site.

Educational concept

An important condition for the appreciation of conservation is that of public access to knowledge of and information about the cultural heritage values and the typical seismic configuration of the site.

Christopher Alexander’s pattern language (1977) is an acknowledged design tool, a living architectural language for daily practice that depicts urban and architectural spaces. Each pattern creates a link between a problem and a solution. Expanding the traditional toolkit with material and structural patterns in relation with seismic activities could be an interesting framework for architects and also a communication tool for the owners of the buildings of this site (Leus et al. 2013).

Depicting the engineers’ scientific explanation of seismic activity by means of a drawing could be very useful in improving the knowledge and the values of these structures. It would make more explicit and concrete objectives that are otherwise too abstract.

On the other hand, we should also remark that it could be dangerous to make the tools too simple, because this is not a simple problem. The demands that earthquakes impose on structures are uncertain because many factors determine the forces an earthquake will exert on a building. Configuration plays an important role in the seismic performance of structures that are subject to earthquakes, and should be used on a conceptual level as guidance for the determination of design directives (Elnashai and Di Sarno, 2008: 263-266). Buildings and sites with an irregular configuration are in general more vulnerable than their regular counterparts. Concentrations of inelasticity are often more expected in zones with a varying geometry, mass and stiffness. In a context of limited ductility, such situations lead to failure and the collapse of the buildings. The impact of the structural configuration on the seismic performance depends on a number of elements such as the size, the proportion and dimensions of the buildings, the distribution of forces and concentration as well as the circumference and perimeter resistance. A combination of symmetry (in both directions of the horizontal plane) and simplicity (a clear and direct derivation of forces) are ideal tools to obtain a uniform structure with a homogeneous distribution of the structural elements. In addition, structural reserves are necessary so that if one of the components fails the loads are transferred in an alternative way.

Involving all the actors by raising awareness and providing education can be an asset. When people understand the physical phenomenon of an earthquake and the science of building earthquake-resistant structures, they will feel safe and it will encourage their societal engagement in taking care of this vulnerable cultural heritage. Cultural heritage education is vital to creating a feeling of involvement and responsibility.
Conclusion

We can conclude that the right balance needs to be achieved between the values of the cultural heritage on the one hand and the urban tissue and the necessary interventions for seismic risk prevention on the other. Critically, the viability and effectiveness of every revitalisation proposal must be evaluated by the preservation of the values, the cost/benefit relationship, the risk and the robustness of the interventions. Robustness refers to constraints for new additions that may not overrule the typical character of this site.

Heritage preservation and conservation is a dynamic process, not a static one. The sustainable development of a vulnerable settlement is a complex process that requires a multidisciplinary and integrated approach in which different aspects such as engineering, architectural design, urban planning, accessibility, enclosure, communication, and financing should be coordinated to ensure that all disciplines and actors are on board.

Adopting a holistic perspective for sustainable development of this site will lead to optimal solutions for changing situations or problems.

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References