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## The implicit sustainability of ancient settlements: a case study

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Identity of traditional settlements results from the combination of tangible and intangible factors that, over the time, has made a place significant for individuals or a community. The full understanding of such factors is strategic for the implementation of built heritage management policies that are really compliant with the contemporary, broad, idea of sustainability. On the other hand, the investigation of built environment under the local identity perspective allows the comprehension of the linkages between the built and the natural environment. In fact, it can unveil the sustainable working of some technical elements that, as single items or in their whole, are significant drivers of the place identity. The paper proposes a methodological approach to the investigation of built environment identity and presents the results of its application to Orvieto, a medieval Italian town. As conclusion, potential benefits from this approach in the field of built heritage sustainable management are discussed.

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### Introduction

The need for reducing resource wasting, and then the goal to optimize the use of any kind of resources in built environment, can be considered one of the main characters of vernacular or, more in general, traditional architecture. Under this perspective, it can be often observed that sites with very strong identity, generally characterized by an image or a physical structure persisting over the time, are very good example of built environments fitting characteristics of natural environment in a given site. This means that construction masters or so-called "empirical builders" from the past have produced a sustainable combination of human-built-natural environment, that needs to be preserved in order to implement today sustainable policies for use, management and rehabilitation of built heritage.

On the other hand, rehabilitation of built environment is considered a sustainable practice as itself (Pearce et al., 1996), but success factors of interventions on traditional settlements cannot neglect the consideration of all tangible and intangible factors that constitute local identity, being the mere achievement of new performance/functional requirements insufficient under the contemporary, broader, sustainability approach (Lutzendorf and Lorenz, 2007).

### Local identity and the sustainable management of built heritage

#### The broad meaning of local identity

Identity can be defined as something making an entity definable and recognizable, thanks to the whole of characteristics determining that item as distinguished from any other entity.

Applied to built environment, the concept of identity recalls (Lynch, 1984) the set of qualities and characteristics that we can consider as permanent features in buildings or places, since it is able to resist to changes during the passing of time. Also, identity is the sensations aroused by places in people of more generations (Loewental, 1981) keeping or enhancing the space-inhabitants linkage or, under a more

technical perspective, it can be meant as a, "total phenomenon, which we cannot reduce to any of its properties, such as spatial relationships, without losing its concrete nature" (Norberg-Schulz, 1979).

Focusing on traditional settlements, this concrete reality is constituted by a special combination of constructive, environmental, physical factors that, in their whole, form the identity of built environment. There, a set of technical features is the tangible framework where the sense of identity can rise, as it is easily understandable from typical vernacular contexts. An example is given by the case of agricultural court houses in Figure 1, that are a sample of implicit sustainability of traditional settlement identity, since similar needs have been fulfilled with different technical solutions, strongly linked to local climate and resources.



Figure 1. Italian rural court houses: a) Valtellina, b) Campania region.

On the other hand, it has to be considered that built environment management is a really wide field of action, since rehabilitation is applicable at any scale, with a broad range of scopes, in every site human inhabited. For that reason, acting on traditional settlements or buildings may easily bring to unwished sustainability implications due to inappropriate transformations of built environment, that can lead to a loss of local identity and alienation of local cultures (Moffatt and Kohler, 2008) with the consequent disruption in the continuity of places experience. All that will finally impede future generations experiencing local identity, as the past generations did, depriving them of the availability of both tangible and intangible resources they have right.

Therefore, traditional settlements are sensitive contexts, where rehabilitation design implies that any technical choice can represent a potential trigger for the loss of local identity comprehension or preservation. Under this perspective, a sustainable approach to built environment management and rehabilitation is given by the full understanding of tangible and intangible components of local identity.

### **A methodological approach to identity understanding**

Built environment policies for traditional settlements must be provided with adequate data, suitable to feed a decision making process resulting in conservation/transformation choices that are able to preserve tangible and intangible factors constituting the place identity.

Technical factors concerned with the material culture can be either technical elements, either functioning mechanisms and can be considered as "stand alone" and in their whole.

A possible, practical, approach for unveiling technical factors significant for identity comprehension and preservation should be addressed to many heterogeneous aspects of built environment, considering ethnic complexity, historical architectural and natural significance, space functions, places fruition and people behaviors over the time. Technical factors relevant to those issues can convey built environment values under cultural-perceptive, morpho-dimensional and constructive perspective. Moreover, those factors play a key role in identity comprehension and preservation, due to the fact that they can be paradigmatic or originally manufactured in a context. For instance, technical elements that may be significant as local identity drivers are elements evidencing a) original function; b) modifications, substitutions, extensions and any other transformation; c) features or constructive techniques typical in a place; d) features or constructive techniques outstanding from the traditional context because of their

originality or particularity; e) features or constructive techniques still unchanged from the past; f) features having aesthetic value (Attaianese et al., 2007).

## The sustainability of a settlement unveiled by its identity: the Orvieto case study

### The town of Orvieto

The analysis approach here proposed was applied to the case study of the town of Orvieto. More in detail, investigation was addressed to the physical structure of the urban fabric and its evolution over the time, the representations of urban features over the time and, finally, the link between local identity characters and environment.

Orvieto is an Etruscan settlement (the ancient Velzna) on a tuff rock, that reached its maximum development as commercial and religious centre during VI century b.C. After the destruction by Romans in 264 b.C., the rock was abandoned and settlement was rebuilt as Volsinii Novi (Bolsena). In the Middle Age, inhabitants came back to the tuff rock and established the new town that today we know. Still today, this town is a sort of tuff and basalt stronghold, made up with (and upon) a network of underground caves and tunnels.

The town is built over a tuff table, with precipitous cliff faces, outstanding from the mild valley of the Paglia river. The physical limit of the tuff table has never allowed the urban growth with a simple expansion of the built area on the rock, but space need was fulfilled, over the time, producing a high density, stratified, urban fabric.

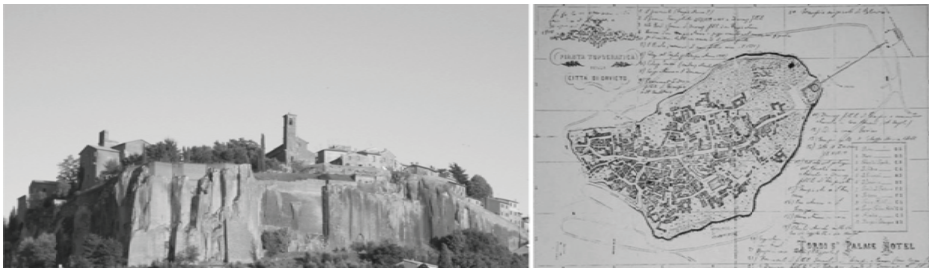


Figure 2. The Orvieto tuff rock, representing a physical boundary to resources purchasing and urban development.

### Factors relevant to local identity

In any medieval town, urban space is limited by defense needs, so that surfaces available for buildings were very valuable. In the case of Orvieto (Ricetti, 1992), this limitation has persisted over the time, since physical limit is given by the tuff table rather than by man artifacts, like town walls. The great attention paid to the optimal use of the space produced buildings quite tall for the age, with narrow fronts on the street and organized in long, continuous, street fronts. This narrow and deep lots, that combined together constitute big urban blocks, derive from the rather standardized length of nearest available tree trunks, from which resulted the regular pace of wood beams and then the regular width of dwelling units. Such as technical module allowed to set-up the sinuous streets and the characteristic pattern in Orvieto urban fabric and fronts (Satolli, 1983).

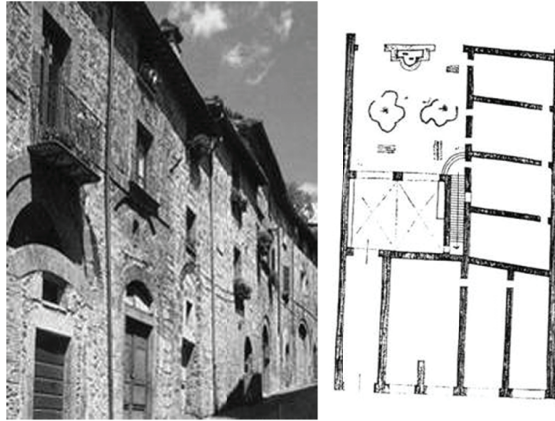


Figure 3. Street fronts and internal layout of dwelling units in San Giovenale quarter.

Another aspect of the built environment identity is the internal layout of urban blocks, characterized by a number of internal courts. In fact, block morphology and width require a layout arrangement suitable to provide with sufficient air and light the rooms that do not look onto the main street front.

On the other hand, the isolation and distance from fertile ground as well as the use of the settlement as a "natural" walled town by popes raised the need to make the town self-sufficient for food production; for that reason all internal courts were used as vegetable gardens.

A further technical element of Orvieto local identity is given by the major building material and its origin. In fact, the rock inaccessibility and the unavailability of suitable rough materials in the surrounding valley constituted an ineluctable drive for using at the best the material constituting the rock table itself: the tuff stone. Therefore since ancient ages, building material was extracted from the tuff bed, realizing a wide network of underground passages and spaces, characterized by the constant temperature of 16°C. Since the rock has not water springs, this complex system of underground spaces performs the key function of draining and collecting water in a great number of wells. In this way, water did not need to be carried out from the outside of tuff table and town would have been self-sufficient in case of siege. Second use is very relevant from an economic and cultural point of view, since vineyard is the main cultivation in the area and temperature of underground environments is particularly suitable for cellar use. At the end, this technical aspect has produced a relevant aspects of the territorial identity, the Orvieto wine "brand", that is known all over the world.

Under the perspective of construction techniques (Chiovelli, 2006), it has to be noticed that tuff walls are characterized by a bricklaying technique showing a reduced use of mortar and plaster (due to the unavailability of needed materials and water shortage on the rock) and well squared tuff blocks. Over the time, blocks dimension became standardized on the basis of maximum dimension allowed for quarries and caves, that was under regulations since Middle Ages in order to preserve tuff rock stability. On the other hand, non-use of plaster determined other technical elements relevant for the local identity point of view, such the need for an alternative protection of the tuff walls by roofs more protruding than usual and façade decoration made mainly in carved tuff rather in stucco, plaster or finer materials to be transported from rock outside.

Last point concerns the image and perception of the town over the time, by both visitors and inhabitants (Satolli, 1974a, 1974b). On one hand, the relationship of the built rock outstanding from the valley and the wide surrounding landscape creates a unique skyline, whose pattern allows Orvieto to represent Italian imaginary in people from every part of the world. At the same time, it can be considered that the overall working of the urban settlement is perceived as a nature-humans combined organism and this, together with the landscape relevance, makes arise a strong sense of ownership in inhabitants.

### **The implicit sustainability of Orvieto local identity factors**

The focus on technical elements playing a role in built environment identity allows the comprehension of how resources use was optimized in the past in terms of urban layout, construction mastery and traditions as well as social and economic organization.

The specific case of Orvieto shows that technical aspects of local identity bring multifaceted sustainability implications. At urban scale, it can be observed that the whole pattern of irregular and wide

urban blocks assures a minimum of fresh air and daylight for all buildings, shields the settlement from strong winds, produces shadowed street lengths alternating with sunny ones. The presence of many small vegetable gardens provides all the hygiene and psychological benefits linked with green areas in a compact urban fabric, bringing also thermal benefits during hot periods. Furthermore the green use of the soil is strategically helpful in water drainage with consequent hydrogeological benefits for rock stability.

Under the point of view of resource saving, it can be observed that many dwelling units are joined together in large fronts, and this brings a considerable reduction of used materials, since adjacent built units share a common wall. On the other side, indoor comfort for building units is assured by the so-called "courtyard effect": during summer period lower parts of the inner court are almost always shadowed, so that tuff walls basement keeps a temperature lower than the upper part. During the day, this difference of temperature causes refreshing flows or air masses whilst, in the night, the heat accumulated by the soil is released, mitigating the night fresh.

Finally, the system of cellars and caves represents a valuable, tangible, heritage to be recalled in territorial marketing, that gives a strong impulse to wine industry and care of landscape.

In the whole, Orvieto technical and socio-economical organization shows a general optimization in use of resources, having created a system that saves materials, reduces transportation, assigns a key role to territory maintenance activities.

Thus, all described technical factors represent significant sustainability aspects, worthy to be kept and taken into account for today built environment management and rehabilitation. Finally, the respect of so relevant factors for local identity supports the fully application of social and intangible components of sustainability (Tiesdell, 1996).

## Conclusions

The paper has presented a survey methodology for investigation of technical factors in local identity. The case study has evidenced that understanding of perceptual, emotional or functional interaction of people with built environment needs to take into account any type of technical feature, as single component or in its wider context. In fact it can be observed how some simple technical factors concerned with the material culture play a key role in identity comprehension and preservation, being particularly significant for a socio-culture and its related built environment.

This approach is able to provide useful inputs for sustainable management and rehabilitation practices, since awareness about technical elements constituting the built environment identity supports the understanding of the extent on which built environment is able to provide expected performances within the main goal to assure the handover of built environment identity from today to future users. This approach can also support all involved stakeholders in recognizing technical factors making up place's identity so that use and management of built environment is based on a sustainable preservation/transformation balance (UNESCO, 2008).

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