RehabiMed Method

Traditional Mediterranean Architecture

II. Rehabilitation Buildings
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Preface

The first Euromediterranean Conference of heads of state in 1995 saw the launch of the Barcelona process, an ambitious initiative ratified in 2005 at the Barcelona +10 Summit. The priority objectives are intended to seek sociopolitical, economic, cultural and environmental synergies from a regional and mutual development viewpoint. It was within this context that the Euromed Heritage Programme emerged in 1998, to contribute towards the improvement and protection of the diverse heritage shared by the different Mediterranean countries.

Traditional architecture, as an essential part of the cultural legacy generated by the collective imagination of the Mediterranean, plays an important part in the actions carried out by Euromed Heritage. In their first years, CORPUS and CORPUS Levant carried out an enormous task cataloguing and analysing the characteristics and typologies of traditional Mediterranean architecture, identifying the problems presented and suggesting the best alternatives for preserving it. RehabiMed wanted to continue this stage of analytical study to develop the essential ideas arising from the needs and urgent requirements detected by these projects – promoting effective, respectful rehabilitation.

Today, in a globalised world, where economic and cultural uniformity mark the development criteria to be followed based on standard patterns, RehabiMed’s proposal is even more meaningful. Rehabilitation counteracts the idea of globalisation, and regional wealth, cultural diversity, different ways of life and particular local features become essential elements to be preserved.

There are many public and private initiatives aimed at recovering constructed heritage; some are oriented towards singular, monumental heritage, which we call Restoration, and others, as is the case with RehabiMed, are directed towards more modest, more abundant heritage with a greater presence in the territory, such as traditional architecture in historic town centres, rural villages and dispersed throughout the territory. This is what we call Rehabilitation, always carried out to provide buildings – the majority of them without any kind of heritage protection – with a use. This activity involving action on what has been built presents a wide diversity of situations, if we look at the Mediterranean sphere. In European countries, rehabilitation activity represents almost 50% of total activity in the sector, while in the countries of the south and east of the Mediterranean basin, this activity does not amount even to 10% of activity in the sector, despite its importance concerning economic development and the social cohesion of the population.

RehabiMed’s aim is to reinforce rehabilitation activity and maintaining traditional Mediterranean architecture as a factor in sustainable (social, economic and environmental) development. Achieving this objective will allow us to move forward with two historical challenges that may appear contradictory but from our point of view are perfectly compatible and complementary: firstly, contributing towards improving the living conditions of residents, who are the people who give meaning and life to this heritage; and, secondly, contributing to preserving the historical and cultural identity of Mediterranean peoples.

To achieve this aim, RehabiMed’s approach has been to work in three directions. Firstly, we have developed some strategic and methodological tools orientated towards rehabilitation; alongside these, we have carried out various publicity actions and training for professionals in the spirit of the content of the tools developed; and, finally, we have launched four pilot operations with real rehabilitation work to test, experiment and demonstrate the importance, possibilities and positive effects represented by good rehabilitation policy.
They have been three years of hard work, constructive debates and experiences shared with experts, with students and, above all, with the population directly linked to our actions, which has allowed us to meet the objective we initially set. We believe that the results are excellent and that we have created a good starting point for rehabilitation to get off on the right foot, giving meaning to the tools created, the training given and the experiments carried out.

I am delighted to present the first volume of our methodological work, the result of the effort of more than 150 experts from different professional spheres in 15 countries. The texts in this publication contain the RehabiMed Method for rehabilitation of Traditional Mediterranean Architecture, which have been considered and drawn up at length to respond to the concerns of our collaborators and experts. In addition, the publication develops the different points put forward by the RehabiMed Method to provide guidelines on specific proposals, to facilitate their application and to show different situations sharing very similar forms of action in the rehabilitation of the regional and urban heritage of traditional architecture. All this should serve politicians and officers of the different administrations to make it easier for them to generate and develop their initiatives to promote rehabilitation from a very broad frame of reference, raising the awareness of the population and getting it to take an active part in decision-making.

Xavier Casanovas
RehabiMed Project Manager

Barcelona, 30 June 2007
Traditional Mediterranean Architecture

RehabiMed uses the term traditional architecture to refer to everyday architecture that is alive because it is inhabited, essentially civilian, domestic and of pre-industrial construction. It is a form of architecture built using local resources, which covers materials, techniques and the skills of its constructors, and it is the fundamental expression of the culture of the different communities and their relation with nature and the landscape. It is an architecture that covers different forms of grouping and the scattered habitat with all its auxiliary constructions, not forgetting the more modest elements (fountains, paths, etc.), which, altogether, form the traditional Mediterranean landscape. RehabiMed focuses broadly on this architecture, including both the rural habitat, fundamental to the humanization and structuring of the territory, and the city, the clear expression of life in community and the optimization of resources and human relations, going beyond the filters of highbrow architecture to incorporate all the values of more modest forms of architecture.

Rural architecture is primarily linked to systems of agricultural and livestock production, which, beyond a simple presence in a bygone landscape, plays a vital role in understanding the processes that have produced today’s landscape, the result of a social and a natural history. Rural architecture has always played a salient role as an element that structures the landscape in which buildings, crops and nature are in perfect balance, the result of a continuous process of change and transformation, a socio-environmental reality generated jointly by biophysical and socioeconomic factors throughout history. The traditional rural habitat takes the form of a heterogeneous variety of built typologies which may be scattered or form small settlements. It is also accompanied by a large variety of auxiliary elements and constructions that are vital to the domestication of the territory (cabins, dry-stone walls, ovens and kilns, caravanserais, fountains, wells, mills, stables, granaries, etc.), and infrastructures (canals, paths, irrigation channels, etc.) which are the result of the historical interaction between natural resources and human ways of appropriating them that bear witness to the coherent hybridization of the biophysical factors of a region and the socioeconomic factors of the community that inhabit it.

Urban architecture, on the other hand, is built in the context of a city or urban settlement, being the expression of a more complex form of community dwelling, in which artisans and traders predominate over the land-related trades and where ‘the new needs and forms of society find their place’ (Mumford, 1961). The urban settlement, though also originally linked to the rural space and to the need to commercialize farming surplus, appeared as a structure to dominate the territory, defined by Braudel (1968) ‘more than by its walls or the number of its population, by the way in which it concentrates its activities on the most limited surface area possible’. The urban habitat covers a large typological range, derived to a large extent from geographical differentiation and from its origin and historical evolution. This historical and morphological diversity not only translates as buildings, construction procedures or materials used, it is also the configuration of the urban form, expressed in the way of structuring and considering collective space (streets, squares, etc.), of organizing constructions and uses which, in the rural world, are scattered (sanctuary, fountain, fortress, etc.), of relating private architecture and public space, developing a greater variety of residential typologies that reflects more complex social structures, in the uses of buildings, in the singularity of its infrastructures (market, school, etc.), and so on. These settlements, which in days gone by exclusively configured the city as a consequence of its growth and transformation, now form an integral part of the contemporary city, where they play the role of historical nucleuses. It is, then, the form of traditional architecture that humankind used to settle and construct its habitat in the territory around the Mediterranean Sea, a palimpsest permanently rewritten by the relations between people and their surroundings, and which has today become cultural landscape and collective imaginary.
Introduction

Qalaat al Manika, Syria

Hacienda Algarrobo, Malaga, Spain

Rovinj, Croatia

Lucca, Italy
A changing world. Architecture under threat

The inventories drawn up as part of the CORPUS and CORPUS Levant (EUROMED Heritage I) projects showed in 2002 the far-reaching transformations and pressures to which architecture, landscape and traditional territory are subject. Today, traditional surroundings are in a dramatic situation throughout the Mediterranean Basin, reduced to a continuing loss of their social and cultural character, threatened by intense degradation and constantly on the retreat. Likewise, the breakdown of the traditional world and the tendency to cultural homogenization as a result of globalization have brought about disregard for much of this architecture, often considered to be a symbol of poverty with values and qualities that are far removed from the mediatized concept of modernity.

Pressure on the traditional habitat began with the process of industrialization, though it was much accentuated by the modern movement and urbanism in the early 20th century, seeking new models of dwelling and building cities that could overcome the deficiencies of traditional settlements; it went as far as denying all functional, social and even aesthetic values, and radically placed ‘the new’ before ‘the old’. This process emerged at different times according to the country in question and whether we refer to the urban or the rural space.

Today, in the era of the ‘global village’, when the metropolitan industrial city is turning into a diffuse metapolis and the borders between country and city are becoming increasingly hazy, the pressure on this architecture and the population that it houses is even greater.

In the rural environment, many villages are becoming depopulated due to the lack of alternatives for development, and others are subject to violent transformation under the pressures of property or tourism-related speculation without the necessary urban planning. This contemporary urbanism is upsetting the historical balance between humankind and nature, and converting the rural landscape into a landscape without activity, where traditional architecture loses its meaning and original function, and is reused and transformed.

In urban environments, the ‘historical nucleuses’ are affected by different problems according to each historical and regional circumstance, which we could summarise according to four main vectors of pressure, sometimes complementary or simultaneous, and with differing degrees of influence: nucleuses in the process of overpopulation due to migration (south-north or country-city) with the subsequent physical (over-occupation and modification of dwelling), social (constitution of ghettos, insecurity, etc.) and environmental (insalubrity, lack of comfort, pollution) deterioration of the urban environment; nucleuses in the process of depopulation due to the abandonment of the historic fabric for the city, with the subsequent loss of social values and the deterioration of buildings and architectural heritage; nucleuses affected by heavy-handed urban renovation work (demolition of heritage, destruction of the historic fabric with the creation of new expressways, incoherent insertion of new architectures), and, finally, nucleuses affected by processes of urban reinvestment, in which we can distinguish three main processes: the development of tourism, tertiarization (especially in historic centres) with the possible loss of the residential function, and gentrification (the installation in a run-down neighbourhood of residents from a
high-income bracket), all processes that can have a counterproductive effect in social terms. Institutions such as the UNESCO and ICOMOS have issued repeated alerts about the loss of this heritage. In this respect, mention should be made of the recommendations of the International Charter for the Conservation of Historic Towns and Urban Areas (Washington Charter) of 1987 and the Charter on Built Vernacular Heritage (1999). Both charters, in addition to providing criteria for intervention, stress the need for long-term action in the form of education and sensitization measures, involving the promotion of training and specialization programmes in areas of preservation of traditional architecture, aimed at technical professionals and politicians, who should head policies for the assessment and rehabilitation of this heritage, and seeking the complicity of the population, an active protagonist and participant in this shared legacy.

It is in this context that the RehabiMed project proposes a series of measures to encourage the rehabilitation of this architecture on the basis of sensitization and training.
Rehabilitating Traditional Mediterranean Architecture

In its global dimension, traditional habitat has a great deal to contribute to a context of sudden changes and urbanization that is neither sustainable nor environmentally friendly, and is marked by a need for the reorientation of urban policies in order to reduce conflicts between humankind and nature, improve quality of life, encourage basic values of community life and call for the recovery of the existing territory and recognition of cultural diversity. For RehabiMed, the concept of rehabilitation covers a broad range of action with a view to recovering and updating a lost or damaged function—in this case, dwelling. On the basis of present-day concerns, rehabilitation means improving the action of dwelling by seeking a point of balance between technical aspects, the preservation of heritage values and criteria of social justice, economic efficiency and preservation of the environment (the three mainstays of sustainability).

RehabiMed continues the task begun by the European Charter of Architectural Heritage and the complementary Amsterdam Declaration, both dated 1975 and promoted by the European Council. These documents put forward the concept of “integrated conservation” for the recovery of run-down historic centres, based not just on the restoration of monuments but also on the promotion of actions to rehabilitate the fabric of dwellings and social measures.

RehabiMed therefore proposes a methodology that addresses the rehabilitation process on the basis of integrating traditional space into a wider territorial context; from the global viewpoint of a multisectoral, economic, social and environmental approach; that is driven by a desire for coordination and calls for consensus of action between the various agents; that is flexible, due to the need for continual adaptation to changing realities; and, essentially, non-dogmatic, not claiming to produce single solutions to the problems of the traditional habitat in the Mediterranean, seeking instead solutions that adapt to the conditioning factors and specificity of each local context.
The RehabiMed Method on the scale of the building. The Guide and its constituent tools

Whereas the first volume of this publication is devoted to the RehabiMed Method and its intervention on the scale of villages, towns, cities and the territory, volume two is its complement, focusing on the scale of the building. It is, then, a text aimed at the architects, engineers and builders who design, direct and carry out rehabilitation work on traditional buildings in the Mediterranean.

Rehabilitation of a building calls for an overview of the territory in which it is set and an understanding of its relation with the territorial and urban context. This is why the RehabiMed Project insists on the need to apply this Guide in the framework of the overall rehabilitation method outlined in the first volume of this publication, which sets out a series of shared, coherent criteria for intervention in order to address the complex problems involved in these situations.

This second volume is also divided into two different parts: a methodology, which we refer to as the Guide, establishing procedures for the successful undertaking of rehabilitation work, and a practical part containing specific tools for concrete problems.

The first part is the product of the joint work of a network of Mediterranean experts who, in the first year of the RehabiMed Project, drafted the basic principles and procedures of the Guide. The texts in the Guide have been debated at length after presentation at the 2005 RehabiMed Symposium in Marseilles, and constituted the conceptual bases for various training seminars in 2006 and 2007 (Nicosia, Cairo, Kairouan, Marrakech).

The second part, comprising practical tools, was written by individual specialists in a variety of fields with a view to providing elements of support for the various phases of rehabilitation work. It aims to cover a broad range of problems and sensibilities which, in our opinion, characterize the Mediterranean basin.

It is true that strict compliance with a guide of this nature calls for a high degree of commitment and may raise issues that are difficult to address according to the reality of a given country and place, but we are convinced that setting high standards will, in the long term, stimulate the quality of the rehabilitation of our traditional architecture and contribute to its preservation.
Second part

The RehabiMed tools

An aid
to the rehabilitation
of traditional buildings
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What are criteria of intervention?

No study, however thorough and multidisciplinary it may be, and no methodology of intervention, however serious and rigorous it appears, can guarantee correct intervention in the process of architectural rehabilitation, whether monumental or traditional vernacular. Highly detailed preliminary studies of a building may on occasion correspond to subsequent interventions that completely ruin its essence or distort its character. Examples of this well-intentioned but ultimately blameworthy attitude are very frequent in the discipline of restoration. This is the case because the restoration discipline is not a science. The preliminary studies applied to the building are taken from the more advanced branches of science, which every day draws a little closer to in-depth knowledge of matter and its history. But this is where science ends. From here on, the rehabilitation project belongs to another disciplinary field that is unprotected by the credibility and impartiality of science.

The rehabilitation project constitutes a leap in the dark between this scientific knowledge and the effective recovery of the building. Proof of the absence of scientific causality in the project is the fact that a single preliminary study, conducted with all the rigour and means available to us, can illuminate a whole range of projects of intervention related only by the fact that they address the same building. What chance, then, is there of developing a restoration project that is respectful of the architectural object, if all the preliminary studies and methodologies of intervention in the world cannot guarantee the correct course for the restoration project? This is where the notion of criteria of intervention comes in. The aim of these criteria is to precede the project and guide the planner’s actions. They allow us to bridge this gap between knowledge and the physical recovery of the building with some guarantee of success.

Criteria precede the preliminary studies. The architect cannot carry out a preliminary study or apply a given methodology as though he or she were mechanically or half-heartedly following a cake recipe. The architect will always undertake a given preliminary study or follow a given methodology guided by these criteria; they are the product not of his or her mental or emotional state, but of collective reflection that reaches beyond personal will. These criteria are not arbitrary, nor random, nor subject to whim, circumstance or the free will of the architect. Criteria of intervention do not constitute the project options; they do not correspond to predetermined images or typologies and are not techniques to be implemented in the intervention process. They precede knowledge of the concrete case of the building to be restored and are ultimately based on the specific circumstances of each case.

There are parameters in the discipline of restoration that serve to guide these criteria, such as the experiences of other buildings with their successes and failures, historical debates, the theoretical
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and practical reflections of the masters of the discipline... This reflection on the need for criteria of intervention as an essential factor in the restoration process, over and above all kinds of preliminary studies and the most rigorous and advanced methodologies, is applicable to both monumental and vernacular architecture.

Furthermore, in the rehabilitation of traditional architecture, criteria of intervention become even more important since, on many occasions, the absence of the means to carry out preliminary studies or the geographical and cultural distance of the most acute methodologies approved by the theorists of the discipline prevent their literal application to the most habitual specific cases. In this respect, clarity in criteria of intervention is more essential than an infrastructure of knowledge and a manual of phases of action.

7 Criteria in traditional architecture

Traditional vernacular architecture is created in close association with the landscape, the product of a sound combination of the material available in this context according to the construction systems and artisan techniques created by its residents over the generations, responding to strict functionality. Similar environmental conditions generate traditional architecture solutions with similar logics, but there are still as many families of traditional architecture as there are climatic, material and socio-functional environments.

The advent of industrialization completely changed the conditions of production of popular architecture, increasingly linked not to the raw material of the place, but to commercial construction materials. In many corners of the globe, traditional architecture has ceased to exist as an active phenomenon. In the rest of the world, it survives in association with isolation and scarcity of means, but its abandonment is foreseeable in the short and mid-term, and this is why we are now studying its conservation.

In general, given the difficulty today of reproducing the spontaneity and naturalness of the builders of traditional architecture, it should be conserved, since it is not in our power to generate new examples. Traditional construction has in many places peaked and can now only decrease.

Within the range of possible criteria for the restoration of this disappearing architecture, once it has ceased on a large scale to be reproduced as a species, there are some simple parameters to be taken into account to allow a generous extension of its useful life, at the same time safeguarding its integrity.

Materials

The materials of traditional architecture must be conserved as far as possible. They merit protection on two counts, since they reflect two factors of traditional architecture: its composition or the mass that comprises it, and its character, expressed by its external
surface. Stone that is slightly worn or dotted with lichens, veiny-
surfaced wood, plaster and renders, woven cane, rammed-earth
walls, etc., constitute the outer and inner envelope of the house,
and their transformation carries with it much of the character of
traditional architecture.

Traditional architecture is most likely to survive a process of
rehabilitation if care and delicacy are applied when replacing
materials and concealing its surfaces. Obviously, rehabilitating a
dwelling to contemporary standards has to strike a compromise
between the needs of habitability and conservation of the
materials.

The materials were handmade by their constructors and, in the
absence of knowledge of vernacular techniques, they must be
conserved for their naturalness and spontaneity and as a record of
the construction tradition of the past. The existence of roofs made
of plant matter (straw, reeds, bark...) requires periodic
replacement due to the perishable nature of these materials, as
has happened since remote times. In these cases, the inclusion of
extra waterproofing protection beneath the plant layer
contributes to its maintenance and extends the period between
replacements.

Another option in this case which, though not as recommendable
is still acceptable, is to replace a roof made of plant matter with
another, more lasting type of traditional roof, generally made of
tiles. This type of transformation has always occurred in traditional
architecture and has proliferated in recent times. Hybrid
vernacular architecture is always preferable to its complete
disappearance.

The surfaces of traditional construction may be affected in a
variety of ways, including the addition of wall insulation, the
creation of chasing to house installations that is then plastered
over, changes in a building’s distribution and so on. These changes
may be necessary, but their indiscriminate, generalized acceptance
ultimately transforms the overall appearance of traditional
architecture. It is necessary to find a compromise between the
conservation of surfaces that give a construction its character and
the inclusion of new installations by seeking solutions that are as
respectful as possible of the materiality of traditional architecture.

The new materials to be introduced into rehabilitation must be
compatible with the existing construction, not only physically but
also in chemical and, most of all, conceptual terms. In this way, for
example, if waterproofing or an extra layer of insulation is added
beneath the protective plant, ceramic, clay or stone layer of a roof,
they must be breathable to prevent condensation inside and, as
applicable, to allow the evacuation of water vapour through
vents.

In the case of having to plaster the external or internal surfaces of
the house due to a pressing need that justifies the loss of quality
or vibration of these traditional surfaces, the mortar used should
not only be breathable, it also has to be flexible. Cement mortar

The character of the architecture is reflected by its external surface. It is therefore a
good idea to gauge the effects of intervention on it. Detail of a façade in La Pobla
de Benifassà (Castellón, Spain).
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Repair consists in cutting out the rotten part of a wooden beam and replacing it by a piece of new timber. The importance of the concept of repairing the structure lies in the conservation not just of its materiality but also of the original structural system, which remains in use. In this case, the introduced material must blend harmoniously with the pre-existing elements and be possible to tell apart, if necessary.

Reinforcing a weak beam consists in inserting elements of support, traditionally iron. This option is used when it is necessary to increase the loads architecture can bear. Repair maintains the building’s original strength, whereas reinforcement increases it, for reasons of physical change, new legislation or a change in function. In this case, the reinforcement should not be accorded protagonism over the original structure.

Unlike repair and reinforcement, the replacement of a beam or another construction element, even if it is a copy of what was there, does not conserve the materiality of the original. The lower the proportion of elements replaced, the more delicate the treatment given to traditional architecture. In this case, efforts should be made to conserve at least the structural principle of the building, which is as important as its materiality.

In this respect, the requirements of present-day regulations with regard to structures and earthquake resistance can be approached in two diametrically opposite ways. If we ignore the existing structure and entrust compliance with regulations to a reinforced concrete structural floor, whether or not it acts compositely, we are seriously distorting the traditional structural principle. Traditional structures tend to be isostatic, so the introduction of a hyperstatic material like reinforced concrete renders the whole rigid, presenting a latent threat to the survival of the house due to
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its added weight, lack of flexibility and lack of seismic performance.
If we simply improve the strength of the existing structure with appropriate metal or wooden reinforcements that act compositely with it, we are maintaining the structural principle that characterizes the original building, at the same time contributing to its ability to meet the required objectives. These dry-assembly reinforcements are also perfectly compatible with the existing structure, unlike liquid reinforcements such as concrete, which produce irreparable damage to the timber of the beams, joists and sheathing or to the plaster of the structural floors, which become food for insects, fungi or rot, as well as undermining their intrinsic resistance.

Function
The fundamental criterion that has always governed the discipline of restoration is this: both traditional and monumental architecture has to have a function in order to guarantee its continuing existence. It is therefore necessary to adapt the building to contemporary living standards.
First, we have to present a reasoned exploration of the compatibility of the old and the new functions and ensure that the building’s surface area is not being used beyond its natural capacity. In both cases, it is difficult to successfully undertake a restoration project, even if we take all the precautions and apply the sensibility described here.
If it is a housing project, the dwelling must meet the same conditions of habitability as those required of a new dwelling. This means soundproofing and insulation to regulatory levels, ventilation and lighting with glazed windows if these do not already exist, a completely waterproofed roof, and the existence of a kitchen, bathroom and heating as applicable.
For all of these requirements, an agreement of commitment may be necessary to allow a degree of flexibility of interpretation of regulations, on the basis of the house’s pre-existing conditions. Making a window larger to achieve better ventilation and/or lighting may ruin the exterior façade, and it is therefore necessary

A post-stressed reinforcement of a deflected timber beam can give it a new lease of life and even make it stronger than it was when original built.

The Wine Museum in La Puebla de San Miguel (Valencia, Spain), installed in an old press in the town, has proved to be perfectly compatible with the previous function.

Dry consolidation of a timber and plaster structural floor prevents the irreparable damage caused by the compression layer on it. Building in Valencia’s seafront district (Spain).
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The functional adaptation of a traditional dwelling to present-day standards calls for particular attention to telecommunications, as the diffusion of electronic communications and the proliferation of the concept of teleworking require the incorporation of these new media into the restored building.

It only makes sense to turn a traditional building into a museum piece if the function for which it was created has ceased to exist. This option is possible and plausible if there is no other more active alternative. However, this treatment must not extend to the rest of the traditional settlement. An entire village cannot be turned into a museum; it would merely become a kind of artificial theme park or stage set, even if the constructions were real rather than the plasterboard they tend to be in both cases. It is possible for some traditional buildings to become museum pieces while the rest of the residential fabric maintains its usual function.

Relation with the context

The restoration project must respect and conserve this relation, which is biunivocal in the case of traditional architecture. The external image of traditional architecture is closely related to the landscape that surrounds it, because its scale, materials, colours and texture are taken directly from it. Traditional architecture requires the conservation of its surroundings to justify its constitution and presence, and the surroundings call for the conservation of the only kind of architecture guaranteed to be fully compatible with it—the traditional architecture to which it gave birth.

The criterion that seeks to conserve a given image does not respond to bucolic sentiment or nostalgia for the atmosphere of traditional architecture, which seek to capture the world in a primitive state at a given moment or time. The image of traditional architecture and, by extension, of traditional settlements, possesses a series of values relative to its dimension and human scale, its integration into nature and its unconscious application before the fact of the principles of ecological architecture, which must be recognised and appreciated.

For this reason, the restoration of traditional architecture has to respect the criterion of conservation of its usual image, which is the product of centuries of optimum use of the construction materials and techniques of the place. If it is necessary to incorporate an annexe or new construction in a context of these characteristics, strongly marked by traditional architecture, the project should seek to integrate volumes, colour and texture in such a way that the new building goes unnoticed in the settlement as a whole.

Likewise, rather than being a reactionary, utopian or romantic attitude to the natural landscape, the criterion of conservation of the surroundings represents the will to preserve the natural landscape that produced the traditional architecture. Conservation of the environment is surely compatible with a reasoned use of the natural means and resources that considers not only net economic profits but also economics in a wider sense, taking into account other factors such as culture, history, sustainability, ecology and identity.

Restoration of traditional architecture cannot be taken independently of its surroundings and the landscape that produced it. The painstaking preservation of an architectural object apart from its historical and cultural context, due to excessive transformation of the latter, is always commendable yet insufficient from the viewpoint of the integrated conservation of traditional architecture.

Implementation

The criteria of action in the field of restoration of traditional architecture not only have to be present before work starts on the preliminary study or when drafting the project, they also form an integral part of the physical restoration work. The implementation of all the studies and the ideas brought together in the project may justify all the hard work carried out in this process, but it could also very easily ruin it. For this reason, it is important not to lower one’s guard during on-site work.

There are three main fronts of attention for the architect during the implementation of the project: the building, the workers and the processes. The traditional building must remain at the forefront of attention throughout the restoration process, which...
may produce data not sufficiently clarified by the preliminary study, issues not envisaged in the project, or corrections and nuances to be considered on site.

Even the best project cannot foresee every incident that will emerge during restoration work, but the more work done on a project, the greater the guarantee of good results and the fewer the problems. The main criterion when restoring traditional architecture must then be to carefully monitor the work after comprehensive reflection on the project in order to respond to unforeseen events on site.

The workers, as actors in the implementation of the restoration project, must share with the architect in the aims of the intervention, otherwise they may simply not become involved in producing the best possible outcome. It is important to invest the necessary time in explaining details and reasons, and the overall aim pursued by restoration work. It may on occasion be necessary to explain the appropriateness of construction processes and techniques that are not habitual for the workers but are necessary for the restoration of the building. It is therefore essential when choosing workers to ensure that if they are not familiar with the processes to be used, they are at least open to new ideas and can adapt easily to the orders given by the architect.

The construction processes are very important to the finished appearance of the restored work. Traditional architecture is characterized by being the spontaneous, natural work of artisans, rich in textures and human nuance. The indiscriminate, direct application of industrial solutions can ruin this spontaneity. It is therefore important to rework all of these solutions and adapt their composition, application and use to traditional architecture. Commercial and industrial solutions have to be digested in a process in which the architect’s criterion has to assimilate, improve, hybridize and transform them to ensure that their entry into the fragile context and matter of traditional architecture is silent, discreet and respectful of its delicate intangible character.

### The project

If it is not possible to carry out some or all of these studies due to lack of available means, visual observation of the traditional building and mental application should be used to prevent the project taking the wrong course. For example, leaving to one side the complementary studies that require specialized professionals, if scale plans of fissuring, mapping or pathologies are not undertaken, they can be observed, noted down or marked on photographs and, above all, taken into account in the project. The unavailability of any particular type of means to carry out these studies in orderly, official, scrupulous fashion does not exempt the architect from the necessary mental and methodological processes before undertaking the restoration project.

It is not common but it does occur that having carried out a comprehensive preliminary study of the building or drawn hasty conclusions as to its structural behaviour, construction problems and various pathologies, the architect may feel qualified to perfect the building’s history, adding finishing touches or correcting supposed defects. To avoid this eventuality, the path to knowledge represented by the preliminary study must be trodden with humility, respect and caution, the same virtues that will later guide the application of the project.

A project to restore a traditional building has to walk a fine line between conserving as much of the fabric as possible and adapting the building to today’s standards of habitability. The supposition of conserving the material building to uphold the dignity of its structural and constructional function must also, as far as possible, extend to the external and internal surfaces that transmit all the character of the traditional building to the observer and the inhabitant.

### Types of projects

There are basically three types of rehabilitation project that address a traditional building from the viewpoint of use: (1) those that maintain the building’s original function; (2) those that transform it for another active function, and (3) those that turn the traditional construction into a museum piece. Even taking as our departure point an appropriate balance between the surface areas of the traditional building and a new programme that does not speculate on an inappropriate use of it, each of these options can avoid or generate a variety of conflicts.
Projects that maintain the building's original function have most chance of avoiding conflict. If rehabilitation involves a traditional dwelling being used as a contemporary home or an old waggoners' inn as a rural hostel, then essentially it should incorporate as discreetly as possible the characteristic installations of present-day standards of living (electricity, plumbing, bathroom fittings, kitchen, heating, etc.) and, as far as possible, improve the building's waterproofing, soundproofing and insulation. Projects to completely transform the building's original function have to beware of distorting the structure, distribution and philosophy of the traditional building. For example, the transformation of an oil press or an old distillery into apartments may threaten the large interior spaces and the fenestration of these buildings due to the necessity of dividing them up. In this case, the effects of fitting installations, waterproofing and insulation are simply incomparable with the damage caused by forcing the original conception of buildings designed for other purposes.

Finally, projects that turn a traditional construction into a museum piece have the advantage of easily adapting their layout and functional needs to pre-existing elements, without having to force or distort them. For example, once the original function is past, the rehabilitation of a mill or press for expository or ethnological purposes respects the building's structure and at least evokes the original. The problems in this case may arise from regulations for the use of public spaces that do not bring a flexible attitude to the existing building and seek to rigorously apply all of their articles.

**Compliance with regulations**

One of the most difficult problems when adapting a traditional building for contemporary use is compliance with regulations governing habitability, accessibility, fire safety, and so on. In some countries, these regulations are very understanding, respectful and flexible in their approach to existing buildings, giving a degree of precedence to historical issues above regulatory stipulations. Others impose rigorous observance, whether the building in question is old or a new construction.

There is an answer to all the requirements of regulations, but the architect has to apply all of his or her efforts and imagination to finding the option that least affects the original structure of the building. If this is not sufficient, they must use their best powers of reasoning to convince the authorities of the need to conserve certain of the building's characteristics, or agree on a compromise of conservation with slight transformations by way of compensation.

For example, a balcony railing that is too low can be extended with a supplementary element. The accessibility of a residential stairway can be improved by rational redistribution or compensation of the existing steps. It may be impossible to respect a traditional stairway in public premises which calls for a new regulatory staircase, but the old stairs can at least be conserved alongside the new ones. Contrary to appearances, wood used for the horizontal structures of traditional constructions is a splendid material in the event of fire, provided it is thick enough in section to allow the safe evacuation of the building's occupants in a given time, which constitutes the basis of all fire regulations. In the event of it not having this section, it would be sufficient to supplement it to bring it up to regulatory fire resistance levels.

The lack of lighting or ventilation of some spaces can be resolved by means of windows built into the slope of the roof, large double doors with glazing, mechanical extractors, etc. The opening of an emergency doorway to the outside in the case of a public building can be resolved by modifying the fittings or changing the position of the jamb. And so on—there are many possible alternatives that allow the conservation of much of the material and spirit of a house.

**Spatial distribution**

The new project layout must above all address the existence of the building's previous distribution and seek to adapt as far as possible to the logic of the original functioning to avoid distorting its structure.

In some cases, preferably in the preliminary study phase, the building's incompatibility with the planned function has to be recognised, either due to lack of space or fenestration, or to the inappropriate subdivision required by the use of its internal spaces. Maintenance where possible of the existing layout is, in any case, a contribution to savings in the intervention, avoiding the superfluous demolition of walls, stairways and other elements, and their new construction in different positions. It also maintains the character of the building's inner spaces.

**Choice of materials**

The choice of new materials to be used in the restoration of the traditional building must take a very careful approach to the colours and textures of the existing materials. Every restoration project involves the incorporation of a percentage of new materials. If the aim of restoration is above all to recover the building, this percentage should be discreet in its presence and as low as is compatible with real requirements.

This compatibility can be achieved by means of a careful choice of materials (timber, aggregate, the impasto of ceramics, etc.) and the texture of their surfaces, as smooth finishes and mechanically produced materials in a traditional building do not sit easily beside pre-existing elements. This calls for a process of reflection and choice that does not involve any extra cost.
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Installations

The increasingly voluminous and invasive insertion of installations can produce a great impact on traditional construction if care is not taken to ensure discreet integration. The installations required by electricity, plumbing, telecommunications, lighting, heating, etc. have become the intestines of today’s buildings, with a length and a presence that requires a great deal of space. The first step to take to ensure compatibility is to examine the various alternatives on offer in order to find the most suitable for the conditions and the character of the existing building. Subsequently there are two clear possibilities: leaving the installations partially or totally on view or concealing them as far as possible. In the first case, the choice of elegant solutions, quality materials, chromatic integration or location above the line of lighting make them more acceptable in the interior of the traditional building. In the second case, building cavity walls that also serve the purpose of increasing insulation, the creation of false floors, passing tubes and cables beneath shelves or kitchen units, etc., helps to conceal the installations without affecting the building’s interior.

In both cases, a healthy dose of effort, reflection and imagination in collaboration with specialized installers will produce the most suitable solutions to respect the character of the building, without necessarily increasing the cost of restoration.

The economics of the intervention

Initial reflection and work on preliminary studies will avoid future errors in the project and on site, the need to correct a chosen course, and unnecessary rectifications, demolition and reconstruction. Ultimately, this initial reasoned approach and the preliminary study help to make financial savings on the intervention. The restoration of monumental architecture and, to

Section of the project to restore an old waggoners’ inn in Torrebaja (Valencia, Spain), which manages to conserves the building’s spontaneous vernacular charm and introduce all the functions required by present-day catering.
a large extent, traditional architecture requires a concerted effort of analysis and thought during the project in order to avoid greater costs during on-site work. The conservation of traditional architecture as conceived of in this article may be branded as romantic, and there could be some truth in this statement. But the conservation of traditional architecture also has a decidedly economic side, as the maintenance of the fabrics, structural floors, roof and other elements revert to optimum use of inherited resources that are simply conserved or reinforced, to the detriment of more expensive solutions such as the blanket replacement of elements. Alongside the economic aspect, there are others such as the sustainability of this form of architecture by definition, its ecological virtues and its commitment to bioconstruction, all aspects being called for by many specialists and future homeowners.
Technical issues in housing rehabilitation

Rehabilitation is not simply remedying a state of dilapidation or putting something in order, it also involves improvement. Traditional construction presents various types of technical problem.

Intrinsic pathologies:

- Damp is a recurrent problem in rehabilitation: rising damp due to capillarity. Damp is also associated with the classic infiltrations via the building’s envelope, due to excessive containment which may be linked to poorly designed insulation or inappropriate maintenance practices (sluicing of houses). In general, the porosity of old construction materials, combined with the absence of waterproofing mechanisms between construction elements, is a constant source of damp which is aggravated by insufficient ventilation. The negative consequences for the building are evident; the consequences for inhabitants are no less real, beyond that of discomfort.

- Deficiency in the materials: since traditional architecture is built using local resources, mediocre quality will lead to greater repair needs (stone pathologies, poorly fired bricks, etc.).

- Traditional attacks on timber: termites, fungal decay, capricorn beetles, etc., before timber treatments were invented, knowing that these treatments also represent problems for the environment (this is why organochlorine treatments were abandoned in France).

- The presence of lead paints represents a major risk of lead poisoning, particularly for children, and calls for very specific working conditions. Lead pipes also contribute to the lead poisoning problem.

- Other issues, such as radon gas emissions that are health hazards for the occupants (radon is a natural carcinogenic radioactive gas given off by volcanic rocks such as granite and basalt, which is a health danger for inhabitants if appropriate ventilation and insulation precautions are not taken).

Pathologies due to inappropriate interventions, often linked to the use without suitable precautions of modern technical materials or procedures in an existing construction, e.g. the application of cement renderings to façades with untreated damp caused by capillary action. Then there is asbestos, a natural product that has been shown to be a real health hazard. We could also mention more classical interventions that disrupt structures: the most usual is the suppression of elements of roof structure (tie beams, etc.) to make space in the attic, a structural ablation that suppresses the original triangulation.

The installation of modern conveniences not originally catered for: bathrooms, rational heating, energy, etc. Even in those countries where rehabilitation is already an old phenomenon, this is a priority for many existing dwellings.

Technical aspects linked to health issues. Some have already been listed above. Failings in indoor air quality still cause respiratory diseases, allergies, etc. Adaptation to an ageing population is a growing issue in housing, due to demographic evolution and the increase in life expectancy. This new factor introduces the issue of the reduced mobility of some occupants and, therefore, the question of accessibility to and inside dwellings.

Technical aspects linked to safety. Firstly, all the accidents that occur in domestic situations in the home, of which the general public is far less aware than road accidents, because they are more “discreet”: accidents caused by electricity networks and dangerous gas, accidents caused by falls (children are frequent victims as a result of failure to envisage this risk and install guardrails), etc., which produce in the order of 400 deaths a year in France.
As regards safety, fire is a large risk that is all too frequently seen by the population as unavoidable. However, when carried out, information and awareness campaigns about good practice do limit risks, as does the installation of simple equipment (autonomous smoke detectors), not to mention sprinklers, smoke extraction hatches, etc.

This long inventory does not set out to be exhaustive. It might lead the reader to think that existing housing is so pathogenic that nothing can be done. Conversely, he might prefer misplaced optimism and decide to take no action. The question, however, is the obvious fact that as regards the technical field, the authorities’ will to improve housing, even private dwellings, cannot be limited to promoting repair work.

To conclude by outlining what I consider existing housing should be in the near future, the objectives should be the following:

- Healthy, adapted housing (with attention to issues of hygiene, comfort and access)
- Safe housing (with attention to questions of structural stability, safety and prevention of the principal risks)
- Housing that does not waste energy or resources (with attention to running costs)
- Housing that is designed to be sustainable (with attention to the long life of the housing product)
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The rehabilitation project

The project is the result of the synergy of a series of decisions, each taken independently of the rest to solve a partial problem. However, since the building is unique, these partial solutions also have to constitute a simultaneous solution to all the problems. This is the greatness and the major difficulty of the architecture project: it will only be suitable if it is the result of a process based on the detailed analysis of problems and solutions that leads to a single solution that solves all of them.

A project to transform existing architecture differs essentially from an architecture project for a new construction. There are particular differences in the case of a project for the rehabilitation of traditional domestic architecture.

The first difference lies in the fact that, although the new construction calls for an understanding of the place and its context, intervention in something that already exists requires an understanding of something infinitely more complex: a series of construction elements that enclose and delimit spaces, which, in turn, are the result of a complex historical evolution, frequently difficult to learn (1), forming part of a sign of identity of a community and a place.

This understanding means embracing intangible, symbolic aspects that are difficult to apprehend other than by patiently listening to the inhabitants of the place or to historical events that are there but very difficult to see, discriminate and explain. It also involves tangible facts such as walls (2), structural floors, vaults, joinery and flooring, and in particular an understanding of how the 20th century has transformed something that may have been constant throughout previous centuries but has been forced to change radically by the blaze of evolution of the last 100 years.

Traditional housing is the product of the optimization over the centuries of a series of types associated with specific uses, producing designs that are closely adapted to the place and the lifestyle of its occupants. But with the arrival of the 20th century, the conditions of use changed radically, leading to:

- An increase in dead weight as the result of upward extensions or additions to the top of a building that exert added loads on the ground-floor walls (3)
- An increase in the number of people using the building
- The loss of the tradition of maintenance of elements that provide protection from atmospheric agents, such as renders that are vital to maintain the bearing capacities of walls and
We are, then, analysing buildings that, in the 19th century, to take one example, might have been in a perfect state of conservation but which, by the end of the 20th century, had entered into a state of degradation due not to poor original design but to powerful changes in the conditions of use and maintenance. Understanding this is a task on its own, and these articles provide some guidelines to undertaking that task. However, it is obvious that until this understanding has been achieved, it would be immoral to embark on a project of architectural intervention.

The path to be followed

Let us suppose that the architect or engineer has reached this understanding; this is a convenient moment to recall the principles with which buildings have to comply. Any element is the consequence of the need for:

- A space delimited by a built material form that is stable from the first moment
- Improvement of the environment and safety of the occupants
- Satisfaction, on the part of the forms and materials, of the desire for beauty that all peoples, however simple, owe to their human condition
- A construction that is as long lasting as possible with the aid of suitable maintenance
- A production method that is as efficient as possible

A good procedure for carrying out a project is to initially follow a course that includes a study of the problem-solution relation from the viewpoint of each principle independently. Once completed, it will be necessary to evaluate possible compromises between partial solutions in order to find those that can provide a reasonable response to the problems, even if each one individually is not perfect. The repetition of the process will, finally, produce the definitive proposal.

Space and structure

The rehabilitation project has to be based on the fact that the space already exists. The starting point of any project for new construction—how to organize a given space according to the programme—is provided. In this case, the task is another: it is necessary first to understand the space, its reason for being and the possibility of introducing changes into it by means of minor modifications to existing elements.

It is very important to remember that the space exists thanks to a series of elements usually referred to as the structure, a word that did not exist in construction terminology until the 20th century. Any important change to the space will involve structural changes.

The key characteristic that differentiates these elements from their present-day counterparts is the fact that both the elements that provide stability and those that enclose space coincide, so that the structure is the outer facing or the latter is the structure. When dealing with traditional buildings, to speak of structure means almost entirely to speak of outer facings. This way of designing buildings is generally unknown to construction professionals who have trained in the 21st century, when the specialization of construction elements means that
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Some provide stability and others provide protection from the exterior; it is therefore advisable to highlight this difference from the start.

Furthermore, before making any decisions, it is essential to follow the process of knowledge and understanding outlined above.

One of the fundamental aspects that the project needs to address is the need arising in association with many national regulations to adapt the new building to technical codes, which are always written for new constructions. This is one of the enormous difficulties that has to be addressed by the overall project, since, by definition, technical codes seek to improve the conditions of new buildings in comparison with the old, with the almost certain result that old buildings do not comply with the new levels established.

The course taken has to analyse all the factors that affect the stability of these structural elements, choosing the intervention that manages at least to reduce the gap between the safety factors established by the new code.

The situation is different if the regulations refer only to dead or even earthquake loads. In the first case, everything depends on the safety level imposed by present-day regulations for new constructions, which can range between 2.5 and 3. If the result of calculating the safety of an existing building is two, it might lead us to conclude that it is not safe. However, there is no point subjecting it to a difficult, aggressive process of reinforcement, since a state of balance that has existed for decades—supposing that no lesion has occurred—is proof that is at least as scientific as the application of regulations.

One particular case is the consequence of carrying out geotechnical studies. Such studies frequently report that the land on which a building has stood for 200 or 300 years is not sufficiently stable. The error may be not just the result of applying this disproportionate safety coefficient; it may also have been carried out outside the building, on a different site to that of the foundations.

The issues change if the regulations govern seismic actions. In regions where long periods pass between serious earthquakes, their effects are not engraved on the collective memory, so builders do not include anti-seismic measures. New regulations based on precise, hitherto unknown historical and geological information, may provide clues as to the probability of a further tremor to which the building is clearly vulnerable. This is, of course, not a case of a pathology, but it is still advisable to make the most of rehabilitation to introduce the necessary reinforcement.

Environment and outer facings

As regards the environment, the project requires a meticulous evaluation of the performance of the envelope of the building in question in relation to the basic variables that determine the environment: firstly, those derived from the natural climate of the place—that is, rainwater or moisture from the site, heat and cold, and natural lighting; and, secondly, those deriving from our own activity, noise and pollution.

The process has to consider three levels of study: the geographical, that of the building’s immediate context, and the building itself.

The most important transformation generated in the 20th century came as a consequence of the increase in technology available in all fields of convenience and comfort. While the envelope of the building is an essential element in creating an interior
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The atmosphere that is favourable to life, our present-day civilization, of which traditional architecture has to become a part, calls for far superior environmental conditions, for which the only solution is to introduce installations of all types: water and electricity in almost all cases and heating in many.

The study of energy saving (also a requisite on the part of the public administration in the form of regulations that have only recently come into existence) is an important issue, as the installations that control heating and cooling are the ones that take up most space. Recent trends point to the incorporation of cooling systems in hot places for the summer months. Likewise, the need to save energy is generating new elements outside the building as well as in its interior. The obligation for buildings to incorporate solar collection systems for domestic hot water is a recent one. It is a major challenge to see how this factor—one which we cannot relinquish—influences traditional architecture.

Nor can we forget the occupant’s safety, a previously non-existent and now key aspect of which is everything to do with fire protection (7) and the necessary adaptation of buildings. We also have to control other lesser aspects such as user safety.

Aesthetic-symbolic values

Yet in isolation, none of the above is enough: all of these elements together have to create a visual message of which we feel proud and that serves to say who we are. As well as resolving all the practical problems, they have to be in keeping with our visual and symbolic culture. In short, an integral part of the building is the satisfaction of the desire for beauty that all peoples, no matter how simple, feel as part of their human condition.

All the variables at play here are perceptible mainly by the sense of sight and must therefore be referred to the visual characteristics of the two constants in construction: form and material.

Form is defined by its outline and by the volumes that can be perceived in the third dimension perpendicular to the observer, subject to the conditioning of the lighting.

Material is defined by the visual characteristics of its surface, composed mainly of two variables: colour and texture. Further, as a result of the complexity of any construction material, we have to add the pattern drawn by the lines that separate the different colours and textures of the specific materials, and the inevitable marks of application or other actions.

The decisions taken on the basis of these considerations have to be reconciled with all the previous decisions, taking care above all not to contradict the consolidated feelings of the users (8).

Maximum duration

The passing of time takes its toll on buildings. No matter what preventive measures are taken, construction elements undergo variations in the basic characteristics of their forms and materials, and, sooner or later, cease to match their initial performance. However, the effects can be foreseen and, to a large extent, reduced.

Each building is the product of its history, and this historical evolution involves factors that give rise to alterations in its initial state that may become lesions or damage. As well as being vital to correct these
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alterations, a study of the building serves to draw conclusions and apply them to the design of new elements, ensuring that these factors of degradation are neutralized in the future.

Damages may affect structural systems, with the serious consequences this may involve, but they can also affect elements whose role is to create a pleasant interior space for all the senses—the finishes.

The project must explore the reasons for these damages and take an integrative approach to solving them.

Experience shows that the elements that suffer most from history—that is, the passing of time—are those that are exposed to the elements, in contact with exterior space, rain, extreme temperatures, groundwater, etc. In the absence of suitable maintenance, they will inevitably deteriorate.

Nor must we forget that these exterior elements play a twofold role of protecting the structural elements, such as walls or roof and vault structures, and acting as a visual support for the proposed aesthetic, symbolic and identity values of the building.

It is, then, vital for the project to analyse the factors of degradation with a view to controlling and correcting them, proposing solutions that may be more resistant, but most importantly preventing their loss and ensuring that their associated aesthetic, symbolic and identity-giving values are conserved (9).

Production techniques
In order to achieve the aim of durability, it is vital to ensure that the characteristics of the materials used, particularly new materials, are compatible with the existing ones, which requires thorough verification. This will include consideration of the long-term repercussions in order to prevent undesirable secondary effects. In general, the choice between innovative and traditional techniques has to be well justified, and it seems reasonable to give preference to those that are least invasive and most compatible with existing elements, always with reference to the requisites of safety and durability (10).

In theory, this automatically rules out the techniques that became habitual in the second half of the 20th century, which not only do not comply with the above aims but have been shown to be pernicious only a short time after application.

Any interventions that may be planned on the basis of these criteria will of course require comprehensive knowledge of the building in question, which will involve applying the criteria of diagnosis outlined here and a thorough knowledge of today’s least aggressive techniques but also, most particularly, the traditional techniques that originally produced the building. This type of knowledge may be the hardest to acquire, as in many cases the techniques have been forgotten, as they are no longer used. This may be an insurmountable difficulty: the absence of workers such as masons and plasterers with the expertise of their fathers and grandfathers.

All of these issues have to be raised at the project phase. If, for example, there is no chance of finding a mason who knows how to build a brickwork vault, it will be necessary to find an alternative solution. In short, the project has to be in keeping with
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The technical possibilities of the place. This is true of new constructions, and all the more so in the case of the rehabilitation of traditional architecture.

Some final considerations

Having completed this process, which gives us an understanding of both the object and the ultimate objective of intervention (to produce an artefact situated in the 21st century which serves present-day inhabitants), the next step is the architecture project. Obviously, the thought processes are not this clear-cut; the overall process of understanding the project progressively gives rise to ways of addressing it.

This is not a bad thing, unless the ideas that emerge prior to a full understanding become so firmly rooted that they are maintained despite contradicting the conclusions of the process of comprehension. This is an easy trap to fall into. Prior ideas in architecture are valid provided they are compared and contrasted during the process of understanding the building; they will, in turn, be factors that serve to incentivize further research. To conclude, the project must meet the objectives of adaptation to the space, adaptation to the environment and conservation of the integrity of the building, using the economic and technical resources available, to produce a result that is satisfactory for the occupants and for the collective as a whole, satisfying the desire for beauty and affirmation of their identity (11).

10. Reinforcement of a traditional vault built with two layers of thin brick ensures the compatibility of materials.

11. Final state of the façade.
The innovation value for quality in the traditional architecture rehabilitation

Ensuring the “continuity of life” of the historical building heritage through an “appropriate use” is the basic objective for a conservation that can be considered, beyond the concept of simple preservation, as a dynamic action of future construction, in terms of “integrated conservation”1 within the social, economical and cultural realities of the territory.

This issue is particularly important for the traditional architecture of the Mediterranean area, as the attribution of new functions, or even the simple preservation of the original ones, can involve the alteration of the formal, technical, material and functional values. Buildings designed for specific uses could not meet the changed requirements, connected to the functional destinations which standards have inevitably evolved over the time. Even the apparently simple conservation of the residential destination, that is predominant within the historical centres, may lead to these contradictions. In fact, the practice has demonstrated, on the one hand, that the critical states for the functional efficiency are not present only when the new destination involves structural, functional and equipment transformations and, on the other hand, that the continuity of the residential destination could allow the conservation of the original features of the building, as this destination is based on activities that change little and/or involve a very flexible behaviour. Besides, the quality of the life at one time required spaces and functions, absolutely unsuitable with the quality now imposed by the modern needs.

Furthermore, the interventions of functional suitability of the building heritage have often produced, especially within the historical centres, an “adaptation” with forced alterations and introductions of elements and characters, that have changed the original typological and morphological aspects, with a dramatic difference compared to the theoretical assumption.

The definition of theoretical, technical and technological tools is an important challenge in order to deal correctly with the issues of both the reuse and the continuity of use for the traditional architecture. It should avoid the transfer of adapted methods or the slavish application of functional and/or technological solutions that have been already experimented for new buildings.

For this purpose, the innovation of approaches and technological solutions can be, far away from a claimed modernity in itself, an essential instrument to face the difficult connection between the conservation of the architectural and morphological values of the ancient buildings with the modern life requirements and the conformity with laws and standards in force, as well as with the demand of more and more specific and complex performance levels.

Quality and rules within the rehabilitation of the traditional architecture

Generally, within the countries of the Mediterranean area, the minimum level of quality for a building is defined, through a system of parameters/standards, by some dispositions that generally refer to “new” constructions, without any specific attention to the existing, historical and more recent, building.

Besides, for the traditional and historical architecture, the common “philosophy” of the prescribing building regulations

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aims to quality control through the imposition of bonds and limitations for the practical procedures, so that a good result, also in relation with the technical and formal issues, has not been always achieved.

A general insufficiency of the dispositions has been demonstrated by different studies, as the environmental qualities have been determinate by generic advices and limitative impositions of numerical parameters, sometimes even conflicting, without any attention to the peculiarity of the intervention or the territory, any explanation of the reasons for the imposed limit and any alternative solutions to meet the required needs.

Clearly, the peculiarity of the Mediterranean traditional architecture makes difficult, sometimes inappropriate, the translation of the building quality into objective parameters and standards: the apodictic expectation to meet automatically the requirements through the observance of the dispositions is absolutely inadequate. These models avoid the rehabilitation intervention, in terms of both “simple” maintenance and refurbishment, or make its result unconnected with the structural, typological, functional and technological features of the artefacts. Even if in relation to the different territorial contexts and, as a consequence, to the specific spatial, material, technical and technological features, the morphology of the building fabric, the typologies and the particular dimensions of the primary architectural units, both in plan and in facade, and the constructive characteristics are an obstacle for the strict observance of the contemporary quantitative and numerical standards, imposed by the prescribing models. Indeed, irregular spaces with over/under dimensioned surfaces are present –from the simple rural one-two rooms North Africa dwellings and the elementary houses in the ancient centre of Bodrum until the wide hypogeum of the Sassi in Matera; extremely variable internal heights can be surveyed –from the small earth structures within the Algerian area until the tall ceilings in Rashied in Egypt, since the low rural compact Portuguese constructions until the elevate landings of several Italian and Provencal historical centres--; very low vault impost quotes feature the traditional spaces in Matmata and Medenine in Tunis and the terraced and “tower” houses in many historical centres of the South Italy, as well as wooden floors (widely spread out in the Mediterranean area) that avoid a correct spatial articulation. Moreover, the vertical connections are sometimes difficult to realise because the landing heights are too high for comfortable staircases which would result too long. Also the ventilation and lighting conditions are frequently inadequate and do not correspond to the requirements, for the absence of suitable windows, as in many countries of the East and South Mediterranean sea, where the reduction of the openings outside was traditionally imposed by the protection from the weather conditions and the safety. Even when the windows are sufficiently large, they don’t often allow a good lighting because of the closeness with the facing buildings (let’s think to the historical centres in Apulia Region). Another issue is connected with the accessibility for people with disabilities, within the single building and the whole urban context. A survey referred to the historical centres of some Italian communes with a prevalent traditional serial building of the Middle Age has shown that, with reference to the dispositions in force, the 30% of rooms has not the geometrical and dimensional characteristics to be considered as habitable, the 40% of spaces is not well ventilated and lighted, the 100% of houses has not an adequate staircase.
could be probably achieved for other Mediterranean areas, because of the homogeneity of the morphological features.

Innovative approaches for the recover of quality
To overcome the prescribing approach is a necessary aim to achieve the quality, since a quality level, not meeting the modern requirements, for a part of the city with an important extension and an emblematic value is not acceptable, also considering all the social, economic and cultural implications. As a consequence, methods and procedures have to be defined for the refurbishment of the traditional historical building (particularly with residential destination) to respect the environmental and functional qualities required by the “contemporary life” and the dispositions in force. The objective may be the definition of performance values that the architecture has to show in order to meet specific requirements and the assessment of technological and functional solutions aimed to their satisfaction.

The performance guide model to guarantee the quality within the building refurbishment process seems to be fitted, as it allows to set quality standards that are comparable with those ones concerning new constructions and to preserve the historical, architectural and morphological features of the existing building heritage. As a result, it prevents from applying prescribing bonds that are used to be disregarded, interpreted case by case or derogated.

Concerning this, over the last years, in Italy, several studies and researches have been developed to revise the management tools for the transformations of territory and cities in terms of performances. Important experiences in this field are just related to the conservation and requalification of historical centres and/or traditional architectural spaces, where methodologies and procedures have been often referred to the peculiarity of the territorial building context, by innovative practice instruments, such as the Laboratories of Quarters, the Refurbishment Handbooks and the Practice Codes. For instance, the Laboratories of Quarter were significant experiences aimed to find new ways for making easier all the choices concerning the physical, economic and social requalification of important parts of the city. All the experiences shared the institution of a “centre” where all the decisions, concerning both the management and the technical-technological aspects, were taken by the participation of citizens, administrations and firms. The Refurbishment Handbook are able to manage the urban and building quality with both prescription and guide actions, in three way: a binding one, by pointing out the materials and construction elements that cannot be lost during the transformation works, even if they are hidden ante operam; a prescriptive one, by indicating the materials and techniques that have to be used during the project, if there are not contraindications; an indicative one, by illustrating through some exemplifications the criteria and methods, that have to be considered by the designers for the project.

A recent research on this topic points out a particular methodological approach, namely a prescription-performance practice tool that allows, by means of more flexibility and less impositions, to profit by the potentialities of the exiting traditional building and so to recover the environmental and geometric-typological values for an integrated and comprehensive conservation of buildings. This model is composed of performance specifications, namely guide and check elements for the performance achievement. They are correlated with suitable
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solutions, that are particular spatial and technological solutions not based on values describing some demand parameters, but meeting the requirements-goals consistent with the building. Afterwards, the performance approaches for the refurbishment of the traditional historical architecture offer sufficient discretion, in relation with the peculiar features of the buildings subjected to the reuse, and freedom about the valuable applications for the achievement of the expected quality result. They are based upon a process at progressive stages, since the definition of a “system of uses” – a set of the technical and technological choices coming from the demand scheme and the performance aims - and a “system of values” – a set of the bonds to the transformation imposed by the architecture to preserve its own identity - until the definition of adequate criteria and methods, through a congruence control to ensure a contemporary building quality of use and a conservation of the historical nature of the traditional building heritage.

Afterwards, the operative ways to meet the pointed out requirements, sometimes explained with suitable solutions, can be referred to both “traditional methods” and “modern use” of historical materials, techniques and structural elements as well as to innovative technological approaches, through the integration between construction tradition and innovation. The table 1 shows a possible scheme of a performance approach for the refurbishment of the historical traditional architecture.

The technological innovation for the quality

In accordance with the experiences over the last decades, the employment of “traditional methods and materials” within the refurbishment of the traditional architecture can be considered as appropriate on the whole, with a valuable congruence between the system of uses due to the requirement reference and the historical, architectural and technical system of values. Therefore, the “technical quality” of intervention, referred to both the functional aspects (from the environmental comfort to the technological equipment) and the architectural-formal, material, static-structural leads to a “proper quality” of all the involved choices and the solutions – the proposition of materials and technologies featuring the existing building is obviously suitable – and to a “relation quality” – the building may keep the formal, technical and structural frame and so a substantial homogeneity. This is valuable beyond any philosophical-cultural evaluation about the efficacy of the chosen approach for the conservation of the historical-architectural system of values.

The above mentioned issues, coming from the contemporary debate on the refurbishment of the historical architecture, explain the wide use of traditional techniques, in contrast with the employment of modern materials and technologies that have been widely and uncritically adopted, over the recent and remote past, without an adequate preliminary control in depth upon the induced effects.

On the other hand, this evidence hasn’t to obstruct the innovation within the building refurbishment. A new balance between space, preserved materials and new functional and technological elements has to be achieved that is a preservation tool, rather than a futile need of modernity, in order to link the tradition (when it cannot meet specific requirements) and the contemporary world. The main goal is not the transformation of the building, but the connection between the performance requirements and the conservation of its authenticity and original structural language, through the employment of evolved products and systems that are able to face appropriately the lack of performance of buildings that are realised with traditional techniques, but cannot be recovered with them. This approach may not concern a useless

Reinforcements of vaults by FRP
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and counterproductive rule, but a choice capability for those situations where the employment of modern materials and technologies may be more suitable in order to respect the comprehensive building characteristics: sometimes and for specific problems, the historical architecture seems to “accept” better the insertion of “light” technologies, for instance the more advanced ones (aimed to integrate rather than to replace), rather than “heavy” interventions, traditionally applied to the building practice over the last decades and connected to methods and techniques of substitution and reconstruction.

However, the innovation is not only be related to materials and systems, with high technological content and morphological-technological compatibility, that are able to perform good durability, mechanical resistance, aptitude to maintenance and to integrate with traditional materials, elements and techniques. It also concerns the adaptation and improvement of the performance and quality characteristics related to the traditional existing products, widely experimented within the building sector. For instance, the Fiber Reinforced Polymers (FRP) have been employed to have the existing building comply with the new safety standards and the unexpected stresses, as those ones produced by an earthquake, even if a great care is necessary,
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because the experimentation are very limited and the calculation and analysis models are not completely set, especially for the reinforcement of masonries, where the employment of composite materials is quite recent. The FRP show many advantages. They use small quantity of material, in terms of thickness and weight. They are removable and easy to apply. They don’t change the original behaviour of the structures, as they work after the tensile resistance of the element has been exceeded. Beyond the general operative modalities, a wide range of applications can be foreseen for the reinforcement of arches and vaults (in order to let these structures withstand tensile strains as they are subjected to combined compressive and bending stress) or for the bandaging of masonries or single building elements (in order to avoid the damage produced by lacking connections between walls). The above mentioned issues underline that the FRP for the structural reinforcement may be more effective and less intrusive for the conservation of the material and architectural features than other materials and technologies, apparently more connected with the construction tradition.

The resolution of problems related to the indoor lighting when the building arrangement obstructs the access of natural light is another example where innovative approaches and procedures are more effective than traditional methods within the conservation of the historical architecture. In fact, the most traditional solution, namely the transformation of the existing openings and/or the realisation of new ones, is also the least suitable because of the historical and architectural bonds. On the contrary, the employment of light integration systems, for instance those ones based on picking up and transferring the natural light flow, may offer more interesting solutions: from the light chimneys, traditional solutions that are architecturally congruent, until the highly innovative light carriers, that are able to pick up and transport the solar light into the rooms with internally reflective pipes. Fibber optic systems may also allow interesting innovative solutions and future developments to carry the natural light into the building. The natural lighting system based on the fibre optic technology is able to provide the environment with a kind of lighting at the same spectrum of the natural light. The produced lighting is directly dependent by the external one and its intensity changes by changing the external one as well. So it follows the natural cycle.

With reference to the previous examples, a choice between traditional methods and innovative solutions is still possible. On the contrary, in case of technological equipment of the historical architecture, in terms of fixtures and fittings not previously set, the same possibility doesn’t exist. So, within this field, the innovation is related to more advanced systems and products able to face the technological complexity to provide the building with adequate safety and comfort standards, by means of the integration among the technological networks and the conservation of the

Scheme of lighting system based on the fibre optic technology

Solar collector panel
architecture and material structure. In this case, the innovation may support the well known methodological approaches aimed to minimize the “disturb” induced by the technological devices, particularly within the diffuse historical architecture where the attention to the original artefacts is lower than to the monumental buildings. The diffusion of automation systems seems to offer interesting perspectives. For instance, new transmission systems of information, data and control can reduce the necessary canalsations and the relative masonry works. The Bus systems are an example that accomplishes multiple tasks related to the energy management and control for contemporary residential and tertiary functions. Instead of independent and diversified technological devices, the new system uses a signal line (BUS), in order to exchange information and to supply the energy. This signal line is composed of a cable which all the system devices are connected to in parallel. The directed waves systems are also effective signal transmission methods (transmission at high frequency by existing carriers belonging to the electric installation), as well as the wireless systems (transmission by radio waves or infrared rays) that allow an “intelligent” management of the building and an intercommunication network arrangement among several systems without any sort of wiring.

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1 The integrated conservation can be defined as the result of the combined action between restoration techniques and research of appropriate functions (ICOMOS, Amsterdam Declaration, 1975).


3 For instance, in Italy a room is habitable if seven standards (Surface, Dimensional Ratio in Plan, Height, Volume, Internal Quote from the Street, Ventilation, and Lighting) are satisfied that have been exclusively expressed by absolute numerical variables.

4 The survey has been carried on some communes in the province of Bari, in Apulia, where the basic building type is composed of elementary cells, arranged as “tower houses”, developed on different floors with separated accesses and connected in two opposite series to shape “double comb” blocks.

5 The Laboratories of Quarter of Otranto, Bari, Rome and Cosenza lasted from 1981 until 1995. The pilot experiences of the Laboratories of Historical centres were equally interesting that were instituted by Sardinia Region in order to activate management and preservation tools for all the several small traditional historical settlements widespread over the territory.

6 Among the Refurbishment Handbook, the first is the “Restoration Reference Book” in 1977 within the Laboratory of the Associazione Intercomunale Pescara; then, the “Refurbishment Handbook of Rome” in 1989, the “Refurbishment Handbook of Città di Castello” in 1992, the “Refurbishment Handbook of Neapolitan construction traditional techniques” in 1994, the “Refurbishment Handbook of Palermo” in 1994; finally, the handbooks referred to Matera, Ortigia, Umbria and other ones. We highlight the “Catalogue of Typologies and Architectural Elements” of Umbria Region that with the “Model of Building Regulation for Refurbishment” constitutes the basic reference for the urban and building requalification of historical areas in Umbria Region.


8 The performance specifications are the operative contents of the model and contain the basic concepts to meet the considered requirements. Their structure is composed of a description-performance proposition and a procedure scheme: the former expresses the performance quality goal, the lower limit values of numerical parameters that involve the requirement meeting, the criteria to verify the performance quality when to respect the pointed out standards is impossible; the latter, arranged in a block diagram, allows, since the control of one or more demand parameters, to check the possible achievement of the performance quality, by means of both the satisfaction of the pointed out prescription and alternative ways chosen by the designer.

9 A suitable solution is a solution not necessary copied by the proposed model, but that meets the basic features and give equivalent performance values, even if with some differences from the model.

10 Beyond commercial solutions (Solatube Systems), an interesting research, namely ARTHÉLIO (Intelligent and energy-optimized lighting system based on the combination of daylight and the artificial light of sulphur lamps (JOR3-CT97-
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11 The natural lighting system based on the fibre optics technology has been studied and experimented within the projects SPECTRUM and “The Sunflowers”. SPECTRUM Solar Power Exploitation by Collecting and Transportation by fibre optic to Remote Utilisation Modules - Joule European Project (JOR3 CT97 – 0188 C) is a research programme by CEO in Florence; “The Sunflowers” is an Italian programme by CEO. F. Francini and alii, Solar system for the exploitation of the whole collected energy in Press on Optics and Laser in Engineering 39/2 233-246 (2003).

12 The light picked up from a manifold and carried by the fibre cab be spread over the environment, for instance, by means of an “artificial window” (a translucent glass diffuser surface located close to the real window as a natural enlargement) or some terminal elements on the ceiling; both the systems can also be employed in an additional way, in order to optimize the natural lighting of the space.

13 A real application of technological integration and automation principles has been realized within the refurbishment of the abandoned village of Colletta di Castelbianco (Italy), transformed by architect Giancarlo De Carlo into a “telematics town”.
Notes on the rehabilitation and reuse of traditional and historical architectural heritage

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Reuse in architecture is a historically widespread practice directed at built objects which, despite no longer responding to the original demands for which they were constructed, still allow (subject to processes of modification) adaptation to new functions. In general, the concept of reuse is associated with a long-term interpretation of the architecture.

The life of a building tends to be marked by periodic episodes of modification (simple repairs, extensions or partial demolitions, changes of use, review of function, etc.) that reflect changes in society and its demands. These modifications go to define the historical course of buildings, but they can also be regarded as critical moments that put the applicability of a fabric to the test—that is, they verify its capacity for adaptation and, implicitly, of duration. The test of time will be too much for buildings with a closed approach that does not respond to new expectations—that is, buildings that remain static or inert in the face of changes to their conditions of use. Furthermore, there is no disputing the fact that “the older a building is, the more likely that its original structure is no longer intact and that its initial function will give way to others”, and this is valid for both anonymous, current buildings and their historical and artistic counterparts. The latter, with their indisputable historical and artistic value are characterized by a meaning and recognizability associated with a specific function in the collective memory (one example, though not the only one, is the case of religious buildings).

By way of example, many Roman amphitheatres in Italy, Spain or France were absorbed in the Middle Ages into the urban fabric of walled towns and transformed into habitable organisms and Michelangelo transformed the thermae of Diocletian in Rome into the basilica of Santa Maria degli Angeli, not forgetting the endless series of extensions to the Mosque in Cordoba, ending with the conversion of the Islamic mosque into a Catholic church by the Spanish architect Hernán Ruiz the Elder in the early 16th century. These are just the best-known cases in the history of architecture.

The continuity between the sequence of changes and the original act of construction or, to put it another way, the conservation of the building’s own identity, according to Moneo, is possible thanks to the permanence “of the disciplinary principles established by the architect at the moment of construction” and is unaffected by modifications to the actual building, provided these principles are “sufficiently solid” and valid. It is interesting to note that this consideration is still valid if we replace the word architect, historically representing the idea of highbrow architecture, with the word builder, referring to built rather than designed historical-traditional architecture.

Permanence and modification are, then, complementary rather than opposing concepts. Modification inevitably follows construction and may in some cases involve traumatic consequences, but the identity of a work with personality and character will in the long term be reinforced rather than questioned.

Consequently, the practice of transformation forms an integral part of the evolutionary process of all architecture and is possible only by means of recognition and respect for the original nature of the fabric, because “architecture that is clearly defined will always be open to new interventions that indefinitely extend the life of a building”. Modification is, then, the most valid instrument for ensuring its permanence.

Nonetheless, reuse presupposes a cessation in the continuity of use of the building, an interruption in the activities carried out,
awaiting a possible new fate. Rather than a reductive interpretation as " [...] a simple change of use"5, reuse can be seen as the bridge that re-establishes continuity between the past and present of the existing building.

Conceptually, modification constitutes the essence of reuse, as indeed it “involves a transformation, a veritable metamorphosis of the existing. The presence and absence of continuity do not simply go together, they actual form an indivisible relation”6. In the life of a building, its reuse coincides with a crisis of loss of the values that hitherto underpinned its meaning and existence. Reuse involves assigning the existing construction a new system of values and meanings, different to what went before, which is why this is not always possible7. Reuse must, then, be seen as a dynamic instrument by means of which the pluralities of past and, most probably, future successive uses become stratified, intersect and establish a rapport8, not simply as a change in function.

The building boom that hit Italy in the late 1950s, along with the need for post-war reconstruction, population growth, the industrial development of cities and the resulting phenomena of migration to them, decreed the depreciation of existing built heritage. The idea that had until then governed the ongoing logics of maintenance, repair and reuse of pre-modern architecture, was supplanted by the economic reasoning behind new constructions, mainly associated with industrialized technology and the mass production of construction materials and elements. At the time, it was probably more convenient to build new constructions than to conserve and reuse old buildings, due to the rapid disappearance of the professionals who conserved the technological and building expertise of traditional practice.

The passage from the second to the third millennium has seen many changes in the conditions that most directly influence the relation between space and society; this is a period in which population growth is undergoing a reverse trend, with zero birth rates. The buildings constructed in the last 40 years have aged suddenly, unexpectedly and probably to a larger extent than traditional constructions. Today, large and medium-sized city centres are coming up against a sadly chronic lack of development land and, as a result, the displacement of inhabitants towards the centre—giving rise to a new distribution from old towns to city outskirts—seems irremediably blocked or, perhaps, about to be reversed. In short, the phase of unbridled expansion that cities experienced in the second half of the 20th century seems to be set to undergo a radical inflection: the city, in a wealthy, ageing society, seeks within itself new—or old?—places in which to live, and quality in the installations far outweighs quantity.

All this, along with communities’ manifest need to discover and re-appropriate their cultural roots, generates interest in the built historical fabric. From this viewpoint, the recovery-reuse binomial once again becomes the operative instrument of a cultural model which, to paraphrase Magnano Lampugnani, could be defined as the model of maintenance and continuity, as opposed to a more ephemeral, short-lived model such as the case of replacement9.

Now, the rehabilitation project constitutes an act of foresight, reading and interpreting the main characteristics of the existing to plan its potential for reuse in the near future. The motivations behind rehabilitating buildings are, firstly, of an economic nature, which might be summarized thus: “[...] since it was not possible to construct new buildings, work was carried out on the existing structures”10, though in keeping with Riegl’s definition of the unintentional monument “[...] we must not forget that history, for at least 50 years, has valued them as sources of material testimony, especially if they are many and widespread.” Therefore, “suppressing a building or a part of it amounts to erasing a page in the life of society that has been passed down by the material itself”11. And this is even more valid in the case of popular architecture; despite as a rule having no design documents, it recounts its history, from the twofold viewpoint of continuity and mutation, by means of the built work itself. Indeed, “[...] it is necessary to see spaces and their subsequent transformations as a precious, irreplaceable book which, by means of materials and the configuration given to them by the people who lived there, tells of the change in use and social balance more effectively even than a drawing, and justifies the choice of continuing to inhabit these spaces and the decision to conserve them”12.

The historical period in which we live is going through a moment of reflection on the choices made and possible new paths, and is characterized by an increasing exhaustion of resources. This
requires us to place the issue of saving, in the broadest sense, at the centre of debate and research, bearing in mind that “[...] producing to consume and then throw away means waste. And waste is precisely what we cannot afford in a world affected by mountains of waste products and worried about its limited resources”¹³.

These are just some of the substantial reasons pushing us towards a definitive awareness that our existing built heritage is of great cultural value. It is, however, without the slightest doubt, an economic resource, an important added value, which at present we are allowing to fall into disrepair and have to revalorize as soon as possible.

Conversely, the terms of the urgency of the reuse of a building can be inverted, as Corboz provocatively posits, in which case “[...] it is necessary to declare the need to destroy rather than the need to conserve [...]”¹⁴.

The rehabilitation project, potentially part of the rich vein of the built project, has to address a plural system of links, since it addresses a built organism that is there to be reused. On the one hand, for the project, the building is a physical, material place in terms of its architecture and construction and a virtual place by virtue of its historical, evocative dimension. At the same time, the new use presents demands that are linked to the restructuring of the building.

A good rehabilitation project, then, has to be able to choose suitable new functions for old buildings that are compatible with their original essence. The equation that simply balances the reuse of the old building with the new function is meaningless, as it expresses something that is impossible. “In the face of the continual destruction of resources and memories that is erasing a little more of our cities every day, the foremost parameter in the evaluation of a project has to be its ability to respect and use existing resources”¹⁵.

Modification as a result of reuse of existing buildings, and particularly of the project in consolidated areas, though not necessarily reuse in the strict sense, once again sets forth the dualism between old and new, especially due to the technological progress that is now radically changing the languages of architecture.

In these cases, the critical act of the project necessarily has dialectical contents: the new has to affirm its own project identity without prejudice to the pre-existing. The project mandate is to establish a nexus between old and new. The relation should not be one of antagonism, because “[...] the project is constructed with different parts, some that are by necessity new and others that existed beforehand. Bringing the two together will not involve a unitary composition; it will be an attempt to achieve a level of quality analogous to what existed before”¹⁶. That which is already present will guide the course of modification when these levels are defined, to then extract the vital lymph. In other words, the designer has the difficult task of understanding the complexity of the old building and then defining the modifications accordingly.

In his interesting essay Del contraste a la analogía, Ignasi de Solà-Morales further clarifies the connection between old and new in the recovery project, indicating that “[...] a new architecture is physically close and relates visually and spatially to the existing, but it also establishes a real interpretation of the historical material. This material, of which the architecture is comprised, becomes the object of a veritable interpretation that, explicitly or implicitly, accompanies the new intervention in its overall significance”¹⁷.

Analogy and contrast or “similarity and difference”¹⁸, to use well-known binomials, are ultimately the ciphers of the recovery project in which tradition and innovation come together and are stratified. The cognitive approach—the diagnosis project—referred to above is a vital preliminary instrument to undertaking this comparison. It reduces the random component without actually eliminating it¹⁹, and is unable to deterministically codify the actions of the design phase. Since each case insists on its own individual dignity and the very plurality of cases generates the complexity of urban systems, this complexity cannot be extended to methodological generalizations and simplifications derived exclusively from typology. It must be said, however, that typological taxonomy, if correctly used—and this will depend on the choice of the parameters of evaluation—can be an important instrument of support to the project in defining the criteria of interpretation and comprehension of its own complexity.

We are aware of the difficulty today of referring to a theory of...
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rehabilitation or of more general comparison between existing and new that is univocally accepted. It is, nonetheless, necessary to assume that the contemporary project culture has for some time now addressed the existing in the joint form of conservation and modification, allowing the principles of the restoration discipline to coexist with the need for autonomy required by the architecture project. Without relinquishing the charm of ambiguity in the contrast between the old and the new, it is possible to substitute for "the habitual trio of restoration, reuse, conservation, a more up-to-date, judicious approach: restoration, reuse, transformation".

Homogenous methodological instruments are lacking, but it is still possible to compare certain operative criteria. One such is the "principle of minimum intervention" which represents the principal link regulating the rehabilitation project and reuse, with an approach inspired by cultural stances on the conservation of the historical document. According to this principle, pre-existing elements should only be modified if it is necessary to the new function. From a technical and material viewpoint, this means addressing problems of degradation by means of the priority choice of conservation rather than gratuitous substitution.

Another element in defence of the unique, unrepeatable nature of each existing building, in its historical and material dimension, is the "principle of reversibility of interventions". According to this principle, the rehabilitation-reuse project must not be regarded as definitive; it should, rather, adopt a stance that leaves the way open to reflection on the choices made and enable the removal of what has been added without denaturing or irremediably damaging the original building. In this light, the issue of compatibility acquires a decisive role. It must be approached at two different scales. The first, as explained above, refers to the bonds that the old building imposes on the choice of the new function or, to invert the terms of the question, the degree of modification that the change imposes on the existing building. This ultimately means considering the level of analogy between the demands manifested by the preceding and following functions. The second is more directly associated with implementation, but is nonetheless important. It concerns the possibility of using present-day materials and techniques in the historical fabric. The requirement of reversibility and the difficulty of ensuring that techniques and materials from different time periods coexist harmoniously go hand in hand and suggest the advisability of "systematizing in a building only lightweight and removable elements, whose points of anchorage are independent of the structure into which they are introduced [...]. It is not advisable to try and conceal the means of adaptation; they introduce a refreshing tension, preferable by far to the habitual cunning which consists in trying to convince observers that the intervention is not contemporary". This process preserves the recognizability of the intervention desired by the restorers, though with different budgets and purposes, and is, ultimately, one of the basic requirements for the success of the dialectic project referred to.

The middle way between conservation and modification represents the leading thread of the rehabilitation project, which has the mandate of establishing the degree of prevalence of either approach. This serves to free up rehabilitation from historical
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disciplinary prejudices that do not admit of its propositive value and accept technology as one of its principal conceptual and operative instruments.

1 André Corboz, “Vecchi edifici per nuove funzioni”, in Lotus International, no. 13, p. 76.
4 “[...] reuse [...] implicitly means the existence of interruption to continuity—an interruption in use. In fact, when an intervention of reuse takes place, it is the continuity of use that is lost, manifesting an inremediability interruption. If it were to continue, there would be nothing to reuse, because reuse, in a context of continuity, is, quite simply, use [...]” Marco Biraghi, “La via del nuovo”; in Casabella, no. 672, p. 15.
7 “The relation between new architecture and existing architecture is a phenomenon that changes according to the cultural values attributed to the meaning of the historical architecture or the intentions of the new intervention.” Ignasi de Sola-Morales, “Dal contrasto all’analogia. Trasformazioni nella concezione dell’intervento architettonico”, in Lotus International, no. 46, p. 37.
8 “In the buildings of the past that are subjected to constant variations of use, the old and the new combine. Original, almost intact constructions, preserved for reasons of economy or out of respect, are found set in more recent buildings; exposed or concealed beneath its rendering; or perhaps just fragments show off architectural forms modelled by the superposition of functions and meanings in new uses. When the system of relations that generates the architectural form breaks down, the latter, testifying to the autonomous, unpredictable nature of its lifetime, may conserve fragments of the original meaning or, rather, generate new ones.” Alberto Ferlenga, “Separazioni”, in Casabella, no. 717-718.
9 “Insisting on the dimension of durability in the project means imposing a series of conditions on its suppositions, methods and results. It means above all choosing between two antithetical models of production: the replacement model and the maintenance model [...]. Proposing a lasting project evidently means choosing the latter [...]” Vittorio Magnago Lampugnani, “Ricambio o manutenzione?”, in Lotus International, no. 46.

Albagiara, view of the project of rehabilitation and reuse of a historical traditional house as a rural culture documentation centre for the region of La Marmilla (project: Carlo Atzeni, Maurizio Manias and Silvia Mocci)
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16 Alberto Grimoldi, Op. cit., p.120.
19 In the opinion of Ignasi de Sola-Morales, “instrumental knowledge of the object does not remove the risk element from the project […],” Op. cit., p. 42.
20 In Grimoldi’s opinion, the existing structure is the material that sustains the project. He writes: “Becoming aware of the need for replacement, on the basis of the consistency of the construction materials, their ability to stand up to atmospheric agents or bear a weight, signifies for the architect the possibility of influencing social relations, of not being a mere designer of ideologies. This matter, which proves the consistency and dimension of resources, becomes the framework of reference, the established context in which the project finds a space”, in Op. cit., p. 118.
25 On this theme, the German architect expressed some interesting considerations in reference to his work in an interview with Giovanni Leoni published in Área no. 45: “I proceed according to successive strata, in an intervention that is interpretative in nature. I try to insert my architecture by accepting the dimensions and rules dictated by the original and creating the sensation of a reversible intervention. But the changes modify the entire building. There are no formulas, no science. Disregarding the languages used, what is important is that the building can once again be a whole rather than a sum of parts […] However, as I do not proceed by formal imitation, I am necessarily dealing with a dialectic unity, the product of the combined presence of different languages. Mine is an abstract, not a figurative language; the recovery of an essence of tradition according to a plane of abstraction.”
Rehabilitating and building using traditional materials. The Egyptian experience

Principally in Cairo, but also in Syria and the Yemen, the Mission française pour la Sauvegarde du Patrimoine architectural has often been called upon to undertake major rehabilitation or restoration work, in view of the very poor state of conservation of some buildings: subsiding floors, collapsed walls and ceilings that were propped up or had already fallen in made it impossible to use premises. Added to this were varying degrees of modifications that had occurred over the centuries. Faced with this state of heritage, various questions arise: what should be done? What should be kept? Which elements can be suppressed? What kind of work should be undertaken?

The initial intervention to be undertaken when rehabilitating a monument is archaeological: restoring the monument to its original condition, or as near as possible, in architectural, structural and decorative aspects. The second is to determine the kind of work required to rehabilitate the monument in question.

I. Our protection policy

1. Respect for the place
   Restoration work has always been guided by respect for premises and a constant attempt to return them to their original condition. Once the archaeological study is complete, it is necessary to define the nature of work and, in particular, the different types of materials to be used. A list of those used in the construction of the building should be drawn up as part of the archaeological study. It now remains to implement them. The wide range of different modern materials currently available on the market may seem to have simplified the problem of restoration, and there is a strong temptation to use these materials without proper judgement to restore old buildings.
   This situation calls for a very careful approach; we have seen the upheaval caused by the advent of cement, 150 years ago, and, as a consequence, of concrete, with the resulting craze they produced, and can appreciate the technical achievements they have generated.
   But we have also witnessed the catastrophes it brought about in old buildings everywhere: fissuring after repairing stone walls with breeze blocks, salinization and shattering of stones after applying cement mortar bonds, swelling of renders after applying a cement coating to a brick wall, and so on. Many people, from lack of knowledge, have turned to this rapid mixture, thinking that cement was the miracle solution to building problems.

2. Finding old techniques and materials
   For restoration work to be entirely satisfactory, it is necessary to find the old techniques and, above all, the materials used to build the original construction, in an attempt to ensure homogeneity. Corresponding to each stage of work is a series of basic questions about restoration, centring in three areas: the use of quality materials, the competence of the workers and funding. In many cases, however, it is unfortunately the third point, the financial aspect, that conditions the first two.

II. The materials

1. Stone
   A technical study of various samples taken from the buildings in question showed that the original stone used in 17th- and 18th-century Cairo to construct buildings was a stone of excellent quality. Pinkish in colour, this limestone called gebel ahmar (red stone) has an excellent compression coefficient and is damp
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resistant. However, the quarries had been unworked for a long time, probably because the seams had been exhausted.

In Egypt in the 1980s, the only stone used in restoration was a poor quality white stone quarried in Hélouan, near Cairo. In both aesthetic and technical terms, this stone was inadmissible.

We insisted to those responsible that an identical or very similar stone should be found to the one that was principally used in construction in Cairo in the Ottoman period. It was in vain, however; the possibility of opening a new quarry was beyond our means.

But the idea lingered, and our insistence on using the stone called gebel ahmar in restoration work later bore fruit. Ten years later, when the Mission française undertook another case of restoration in Cairo, the demand for gebel ahmar had grown to the extent that new quarries had opened and were commercializing it.

The solution used in our first restoration job was, then, to buy stone salvaged from non-listed 19th-century buildings that were being demolished. This solution was, of course, cheaper...

Dressed to the dimensions we required, this stone was the same colour as ours and, most importantly, had the same mechanical characteristics, allowing us to include it in old walls without creating differential tension or shear stress in the event of overload.

2. Brick

The problems with brick were slightly different, in that old bricks, comprising a mixture of clay and poorly fired ash, were full of mineral salts as a result of rising damp. This material was difficult to salvage, as the texture of the brick had become friable, and it was necessary to look for an alternative material.

We then looked at the possibility of using locally produced fired bricks of similar dimensions and technical characteristics to the ones we needed. Tests were carried out, with the conclusion that this type of brick could, as in the case of the stone, be used to repair old walls without creating differential tensions or shearing. It was subsequently used throughout the site.

3. Wood

The problem of timber was also addressed with great care: a general study showed that most of the building’s joinery had been made using Douglas pine, called azzizi in Egypt. In the 1980s, this type of timber, long imported from Turkey, came from northern Europe. The quality, however, though similar, was not satisfactory.

As in the case of stone, we turned to beams salvaged from 19th-century buildings that were being demolished. Once reworked, these beams provided an excellent timber that was very healthy and had over a century of seasoning. The joinery was restored without problems, the old and the new timbers working together in perfect harmony.

4. Mortars and coatings

The examination of mortars showed that they were all lime-based. The same was true of the renderings which, in some cases, comprised a mixture of lime and gypsum, with up to 80% gypsum.

However, the main problem with mortars and renderings was how to combat the use of cement. The drawbacks of using a mortar of this type when building a stone wall are well known. Unfortunately, this practice was still very widespread in the 1980s in Egypt and other nearby countries, and it was difficult at the time to convince the artisan workers of the danger of using this kind of mortar. The result was that, due to the lack of demand, lime was practically non-existent on the Egyptian market.
Our search in the capital produced quick lime that we had to fetch in bulk directly from the kiln. This was the solution we chose. Although lime-slaking is a long and difficult task, the resulting quality is excellent, producing remarkable results in both rebuilt stone-wall structures and façade renderings. When we worked on a second restoration project in Cairo, in 1995, lime had come into its own. Although several varieties were not available, one type was commercialized in sacks, in powder form.

5. New materials: steel, stainless steel, concrete, tar...
The state of buildings, and particularly the new function of these monuments, may call for the use of complementary materials—with certain conditions!
Let us take the example of a subsiding floor in a large mansion. It comprises timber joists supporting a heavy limestone flooring. Now, the underside of this structural floor is decorated and must be conserved. At the same time, the structure’s timber beams are too weak to take heavy loads, making it very difficult to reuse the premises.
This calls for reinforcement of the structural floor without touching its under surface. In this case, the use of complementary materials is one solution, since despite having a smaller volume, they have greater strength.

After carefully studying this case, the chosen solution was to introduce a metal structure into the thickness of the structural floor to relieve the old timber beams. This was possible thanks to the thick infilling between the joists and the flooring.
In another case, perhaps the solution of concrete reinforcement would have been preferable...

III. Important
There is no such thing as a model solution in restoration; each case must be considered and studied individually. Furthermore, new materials are only used to reinforce an element or structure. They work “under cover” and must not be noticeable when work is completed. In this case, it is vital to dissociate the old and the new structure, to enable them to work separately (problems of deflection, dilatation, etc.), the most important issue being to ensure that the solution adopted is invisible.
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The dilemma criteria: The point of view of heritage value

Buildings are the necessary background for people's activities. They were conceived in order to cover the needs of people, both utilitarian but also aesthetic and symbolic. The typology and morphology of a building reflects the wisdom, mentality, means and way-of-life of generation of people, but also the historic evolution of the settlement, its socio-economic possibilities, its interconnections and relations with other locations, etc. Thus, the heritage value that a historic building encompasses is not restricted in the mere physical or even townscape characteristics but also more profound values, identities and testimonies.

But besides the landmarks or the other monuments of the extraordinary human inspiration such as palaces, cathedrals or other religious buildings, castles, forts, or other public buildings, there also lies the anonymous architecture that forms a significant part of a settlement's townscape, identity or its “sense or spirit of place”.

The preservation of the traditional architecture is not as self-evident as for an important monument. Its heritage value is not judged by the community to be of a national significance. Thus, a building of this quality cannot be restored "per se", but needs to continue to take part in the settlement's active life. However, its physical existence and material amelioration is important for several reasons. These can be theoretical, symbolic and abstract such as the historical testimony that they offer, but also pragmatic. A well preserved architectural setting is a comparative advantage in a competitive globalized world. Likewise, a building with historic, architectural and other heritage values carries additional assets in terms of space quality and added value for their contemporary use for both residential and commercial purposes.

Contrary to the restoration of monuments, buildings of traditional architecture need to have a continuous and sustainable use. Only when in use they can be maintained and kept “alive”. But not all uses are appropriate for all historic buildings. On the one hand the modern needs demands the addition of new technological, sanitary or other installations and amenities, the re-arrangement of the interior or addition of space. On the other hand, modern materials and techniques make the restoration process easier and less expensive. But these alterations, necessary for the continuation of use or for a new use, once the original has seized to exist or cannot correspond to the modern demands, often undermine the heritage value of the building. This threat brings us in front of a dilemma: to preserve the cultural heritage embodied in the structure of the historic building at any cost, or to allow the predominance of the new use? Is there equilibrium between the heritage and the economic and utilitarian value? And where exactly does this line lie?

There are no recipes or standard solutions. Each and every building has a different heritage value, problems and opportunities. Thus, every individual building must be judged for itself. The same applies for a building's setting. Heritage values differ from country to country, but even from one street to the other in the same neighborhood. Similarly, as judgment is a subjective process, the evaluation criteria for the heritage value differ from an individual to an individual. The professional, sensitive to issues of architecture or human history and geography, sees infinite information and value where the ordinary man might only see “stone and mortar”. Similarly, public institutions (e.g. Heritage bodies) attribute great heritage value where the owner only...
attributes “holiday” value. In other cases a Local Authority might wish to deny the existence of the heritage value of a building in order that this gives way to new highways or squares.

Even though the judgment of the heritage value of the traditional architecture is subjective and varies according to education, sensitivity or financial or other interests, the responsibility for its preservation is an objective and a requirement for all societies. This responsibility is materialized in the legislation of each country and reflects not only the individual society’s sensibilities but also its obligations according to the international conventions that the country has signed.

Concerning the restoration of traditional architecture, the public sector has a mainly regulatory and less often a pro-active role. The initiative for its rehabilitation usually lies in the private sector that undertakes a considerable investment and needs to get more “for its money” than the mere preservation of heritage value. In other words, the objective of any private investment is profit whether this is cash revenue, or the satisfaction of a housing need. In this sense, the attributed heritage value is seen as an obstacle for an increase in the short-term profit that the property has to offer. For that reason heritage values cannot depend solely on individual judgment. In Cyprus, as in many other countries, Public Authorities regulate the rehabilitation process of traditional buildings by including restrictions, design guidelines or other obligations in the Planning Permits (or Consents) for buildings that are characterized as listed or Ancient Monuments.

The objective of these regulations is namely to help in finding the right balance between heritage values and utilitarian values for each individual building according to its specific qualities. Design guidelines are focused on the material expression of these values and also to the authenticity of the building.
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Systems and equipment installations challenges

The patterns of contemporary living conditions have added an additional parameter to the challenges presented to professionals when restoring historic buildings: that of the introduction of mechanical, electrical and equipment installations.

**Mechanical and electrical installations** pose certain technical limitations regarding their installation both in new and in historic buildings. In newly designed buildings however, it is often the case that the building design is adjusted according to the systems installation needs, whereas when designing interventions for restoration the systems installation should largely be adjusted according to the restoration priorities.

Technical limitations of mechanical and electrical installations may include anything from the diameter, length and route of a pipe, to the location of a noisy chiller in the exterior environment of a historic building. Usually, the floors, walls and ceilings of a building are the most vulnerable areas for interventions by system installations. Horizontal and vertical proposed routes for these installations may drastically affect the structural capacity of the historic building, but also the character and use of a space.

**Equipment installations** for kitchens and W.C. can also unnecessarily strain the structure, character, authenticity and use of a traditional building. Firstly, the location of such uses is preferable to be done in extensions to the historic building, especially if the original building never accommodated such uses. Secondly, it is preferable that furniture such as kitchen counters be as detached from the building fabric as possible, or be incorporated in mobile units.

Quite often, a lack of sensitivity on behalf of mechanical and electrical engineering consultants is observed during restoration of historical buildings. Therefore, the architect as coordinator must assume the role of promoting multidisciplinary work in order to safeguard the application of internationally accepted restoration principles in favor of the historic structure. Creative solutions may be reached through restrictions posed by the building itself, technical, programmatic and financial limitations.
In an attempt to approach this issue we propose the following as general strategic criteria:

1. Minimal intervention on the building fabric
2. Minimal intervention in the surroundings of the historic building
3. Reversibility of the installations
4. No disruption of the structural capacity of the historic building
5. Retain the character of interior and exterior spaces
6. Easily identifiable elements but aesthetically non-intrusive
7. Easily accessible installations to assure inspection and avoid damages in the case of leakages (especially for plumbing and sewage installations)
8. Respect for pre-existing systems which may have historic or archaeological value
9. Compatible introduction of new uses in certain spaces of a building

Some examples of restoration projects in Cyprus, which have successfully integrated systems and equipment installations, can be seen in the restoration of (a) the Omeriye Ottoman Baths, (b) the Chrysaliniotissa Kindergarten project and (c) the Shadow Theatre Museum:

a. Omeriye Ottoman Baths, walled city of Nicosia
The new water supply pipes in the “hot chambers” were installed at a distance of about 5cm off the outer face of the walls at the same height of the existing terracotta pipes. The original pipes were kept inside the mass of the stone walls as a testimony of the building’s history since their physical condition and contemporary water supply needs did not make it possible for their reuse.

b. Chrysaliniotissa Kindergarten project, walled city of Nicosia
The new WC and kitchen were located in the new extension to the listed building, in order to preserve the character and relationship of spaces in the historic building.

c. Shadow Theatre Museum, walled city of Nicosia
Ducts and pipes are screened by perforated metal sheets and placed in an easily accessible location, without disrupting the wall of the traditional building.