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Holistic Approach in Recovery and Conservation of Modern Architecture as Sign of Historical Identity

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In 20th century a new ideological paradigm emerged in architecture, leading to mutations of function, form and technology, and marking a break with the traditional configuration of spaces, compositional and aesthetic forms. This trend has imposed an architecture based on simple and functional shapes and industrial materials, without excessive ornamentation. Through some selection criteria it is possible to recognize in the modern production "signs and meanings" of historical-documentary value, to be preserved and protected. Currently, there is a lack of consensus in local and national regulations on the criteria to be used for the selection of works to be recovered rather than demolished, on the materials and construction techniques or about the interventions on the Modern Movement architecture, often guided only by economic criteria. The main challenge is how to recover the existing heritage and adapt it to the necessary conditions of habitability, functionality and sustainability of the XXI century, without breaking with its own identity characterized by rationalism, functionalism and industrialized technology. Through a case study in Argentina, this research intends to propose a methodology for the selection of modern works in order to apply recovery and conservation interventions and to guide any projects according to a holistic approach.

Introduction

The architectural production of the last hundred years connotes a large part of territories and cities all over the world that, when inspired by artistic, architectural and handicraft ideals, represents an exclusive set of ways of planning, building and using contemporary resources. Many works lie in an advanced state of decay, due to poor cultural recognition by professionals and community and to lack of conservation and maintenance interventions.[1] By considering the three aspects of architectural work – conservation, transformation, maintenance – in a single methodological *unicum* allows to pursue the best choice, not harmful to the artefacts but necessary to improve their life and performance, in accordance with current principles of sustainability. However, if these aspects seem to be simple solutions for new buildings, they are more complex for existing heritage.

The search for sustainability means appealing to "govern" the intervention, according to the uniqueness of each building and 1) in the protection of its historical, cultural and social characteristics; 2) in the ability to ensure flexibility

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1. See J. Cerverathe, "Decline of Modernist Architecture: Deterioration, Obsolescence and Ruins," *Palapa. Revista de Investigación Científica en Arquitectura* IV (2009): 29-43.

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for reuse; 3) in the choice of compatible, reversible and distinguishable solutions; 4) in maximizing the exploitation of the building's intrinsic resource; 5) in organizing an interdisciplinary and well-form operating group; 6) in rationalizing the organization of construction site to facilitate the activities and support their safety.[2] It useful to remember that preservation, protection and enhancement of cultural heritage, both ancient and modern, is one of Sustainable Goals (11. *Sustainable cities and communities*, target 11.4 "Strengthen efforts to protect and safeguard the world's cultural and natural heritage").

Regarding modern architecture, simple solutions cannot be implemented, but the formal and technological peculiarities require more comprehensive reflections that can bring the practice back to the methodological rigor typical of the restoration discipline. Often, in fact, it is common to believe that the examples of the 20th century production, due to their more modern and industrial character, require easier solutions and, above all, reproducibility and maintenance operations in series, not considering the feature of craftsmanship, the innovative aspects generated by the Modern Movement and, even, the affection of local communities.[3]

Research Aim

The holism assumes that all the properties of a system cannot be determined or explained as a sum of its components[4] but all the constituent parts must be correlated with each other, in order to cover any aspect involved. Therefore, it is necessary to understand this complexity and work on each one of the parameters considering the repercussions as a whole.

An architectural project must be at least divided into four main interrelated issues: *Society*, *Architectural Design*, *Structure*, *Sustainability*.

Society: history, evolution, social and cultural context, demography, popular feeling, integration with industry and commerce, urban and social quality. This stage is useful to maximize the potential of cultural heritage, to serve as a driver for economic, social and environmental regeneration, by minimizing damaging consequences of unnecessary expenditure. An architecture that does not respond to the needs of people, both in terms of functions and design, can cause its

2. See L. Kealy and S. F. Musso (Eds.), *Conservation/Transformation*, Transactions on Architectural Education (Leuven: EAAE, 2011).

3. See E. Garda, "Gli Edifici del Movimento Moderno. Caratteristiche Costruttive e Compositive," in *Manuale del Recupero Edilizio. Edifici in Muratura e in Cemento Armato*, 134-139. Edited by F. Astrua and R. Nelva. Santarcangelo di Romagna (RN): Maggioli Editore, 2017.

4. See N. Portugali, *The Act of Creation and the Spirit of a Place: A Holistic-Phenomenological Approach to Architecture* (Fellbach: Edition Axel Menges, 2006); D. Rodwell, *The Achievement of Exemplary Practice in the Protection of our Built Heritage: The Need for a Holistic Conservation and Sustainability. Orientated Vision and Framework* (Bucharest: UNESCO, Management of Private Property in the Historic City-Centres of the European Cities-in-Transition, Proceedings of UNESCO International Seminar, 2001), 127-153.

deterioration and rejection, generating unexpected changes in its own development.[5]

Architectural Design: artistic act that reflects the language and style of a such period in a specific geographical context; the way in which space and functions are articulated. Through the project, the conservation and maintenance operations are carried out.[6]

Structure: material process, technologies, construction methods, construction site management.

Sustainability: ability to express concisely and persuasively the connections between the built heritage conservation and the wider national and international agendas of sustainability. Environmental protection measures as well as economic and social reflections are included.[7]

The purpose of this contribution is to provide a methodological approach in defining projects for recovery, reuse and restoration of Twentieth century heritage, according to the holistic approach, here applied to a case study.

The method allows to discern the buildings to be recovered on the basis of clear signs of cultural and construction seasons that testify community's affection towards them.

It is surely not possible to pay the same attention to all the modern buildings, but a primary choice is needed starting from a "value judgment" that allows to draw up the map of those constructions that need restorative and conservative care to pass them to future generations.

Recovery and Restoration of Modern Architecture

Recovery in architecture is a set of interventions in which transformations and conservation are integrated as much as possible, by taking into account both material, physical and intangible aspects such as significance and historic evolution.[8] This activity requires an interdisciplinary approach that includes urban planners, restorers and architects, but also structural engineers, plant engineers, geologists, historians, etc. There is no parameter that is not related to each other, like a chain in which each link is fundamental in the success of the final work.

However, the concept of modern architecture assumes a "quality judgment", excluding all the architectural products made in the Twentieth century built only as a response to market or to industrial needs.

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5. Regarding the role of society in the architectural project see P. Jenkins and L. Forsyth, *Architecture, Participation and Society* (New York: Routledge, 2010); J. Albrecht, "Towards a Theory of Participation in Architecture. An Examination of Humanistic Planning Theories," *Journal of Architectural Education* 42, no. 1 (1988): 24-31.

6. See G. Shankland, "Conservation through Planning," in *Conservation and Development in Historic Towns and Cities*, 73-82. Edited by P. Ward. Oxford: Oriel Press, 1968.

7. See D. Barthel-Bouchier, *Cultural Heritage and the Challenge of Sustainability* (New York: Routledge, 2013).

8. See K. Powell, *Architecture Reborn. Converting Old Buildings for New Uses* (New York: Rizzoli International Publications Inc., 1999).

Thus, it is important to face these moral dilemmas and solve technical and cultural problems when it is necessary to preserve recent cultural heritage, in the awareness that every choice must be calibrated in its own space-time circumstances.[9] At the same time, a more complete historical study is needed, beyond criticisms and censures, due to the unfortunate coincidence of this heritage, especially in Europe, with dictatorial regimes and because of its link with economic and land speculations.

In a first schematization, there are four open issues:

1. *Selection*. In the impossibility of preserving the whole built environment, it is necessary to identify a map of the artefacts to be preserved and recovered, which show the features of testimony of passing time. This screening phase must be conducted in light of specific historical and geographical contexts (Table 1).
2. *Aim*. It is difficult to suppose a purely aesthetic purpose, as a "museumization" of modern works. The goals can be many: i.e., functional, technological, structural recovery, adaptation or improvement by virtue of legislative provisions, restoration of surfaces or finishing works, materials, etc. In accordance with the aim, the related methodological and operational phases are defined.
3. *Technical difficulties*. Traditional construction methods suffered a rift, in the late Nineteenth century, with the introduction of new materials and techniques that encouraged the prefabrication and the almost exclusive use of steel and reinforced concrete, replacing the traditional construction with its artisan practice, materials and rule of art. Concrete, first considered eternal, is characterized by particularly delicate internal balance mechanisms and it is influenced by the surrounding conditions (fire, shocks, sea water, physical corrosion, chemical attack, air humidity, temperature, design errors, incorrect concrete production, mix design, etc.)
4. *Method*. Currently the needle oscillates between the rigor of pure conservation and the creativity of a "contemporary redesign". Appropriate methods need to be defined in relation to each problem after a careful analysis phase (Table 2).

9. See S. Macdonald, "Reconciling Authenticity and Repair in the Conservation of Modem Architecture," *Journal of Architectural Conservation*, no. (1996): 36-54.

Table 1. *Fundamental Criteria in Selection of Modern Works*

Main Criteria	Description
Criterion 1: Creative work of human genius	The modern works were designed and built by engineers and architects who determined the development of the construction practice of the Twentieth century. In this way, architectural complexes should be considered not only celebratory of their design and technique but also of those who conceived them.
Criterion 2: Influence of innovative technologies	The development of technology plays a fundamental role in the selection process in terms of architectural solutions, construction methods, experimental materials, etc. Modern historiography of technology requires an interdisciplinary (social, economic, environmental and political) approach capable of investigating the development of buildings.
Criterion 3: Exceptional example impressed in the memory of the community	Many buildings reach exceptional levels both for their ingenious construction and for their ability to survive over time. Originality and authenticity, typicality and exceptionality, historical integrity and affection of the community in figurative or functional terms, are some of the aspects that converge in the selection process.
Criterion 4: Illustrative example of economic or social developments	Modern architecture has been a driving force of political, social, economic and cultural development of each country, satisfying people's desires to live in new, performing and aesthetically satisfying contexts, thus providing a valuable social and economic contribution to the development of society and city.

Restoration of modern buildings, chosen according to the main criteria (Table 1), is recognized as a real restoration work, whose methodological approach is supported by the founding principles of the discipline, beyond obvious differences and still open challenges:[10] reversibility and recognisability are essential and mandatory, contemporary architecture must follow the recommendations of restoration valid when the intervention takes place; distinguishability of intervention seems more emphasized in the projects on ancient works; reuse of modern works and their adaptation to contemporary requirements seem more easily by virtue of their planimetric and structural conformation.[11] This caused incongruous transformations and the use of incorrect and incompatible materials.

Therefore, preserving the modern production implies understanding its specific values, with the identification of the mechanisms and criteria that ruled its construction, transformation and use overtime.[12]

This topic forces us to deal with the founding aspects of contemporary civilization, with the new meanings assumed by the buildings in relation to deep

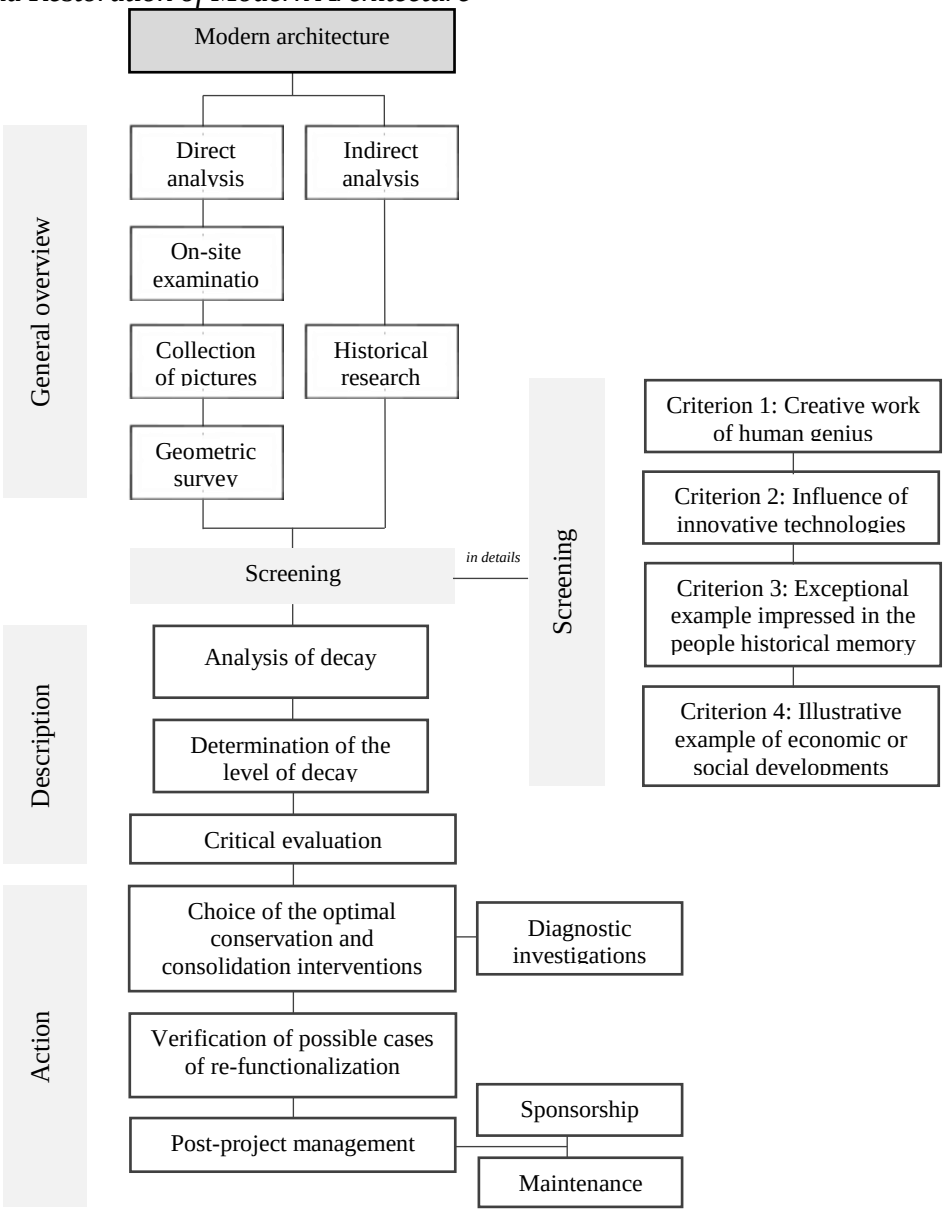
10. See R. Paschoalin and M. T. Barbosa, "Restoration of the cathedral of Brasilia: Challenges and Conflicts of Restoration of Modern Architecture," *Conservar Património* 18 (2013): 45-53.

11. See R. Sanders, B. Shepherd, E. Skowronek and A. Hoffmann, "Sustainable Restoration of Yale University's Art + Architecture Building," *Association for Preservation Technology International Bulletin* 42, no. 2/3, Special Issue on Modern Heritage (2011): 29-35.

12. See M. G. Picchione, "La Tutela delle Opere di Architettura Contemporanea," *L'Architetto Italiano*, no. 4 (2004).

social, cultural, technological and economic transformations.[13] Technological innovations as well as the link between form and structure and the standardization processes or experiments are key issues useful to investigate this theme, understand innovative contents and propose virtuous solutions, overcoming speedy operations of demolition or replacement.

Table 2. *Diagram relating to the Methodological Approach of Analysis, Recovery and Restoration of Modern Architecture*



13. See M. A. Crippa, "Per il Restauro del Moderno. Qualche Riflessione sul Riconoscimento e il Progetto di Restauro di Architettura del Novecento," *Territorio* Nuova Serie, no. 26 (2003).

Application in San Martin de los Andes, Argentina

The research on which this article is based is applied to the building known as the former "Hotel Sol de los Andes", located in the city of San Martin de los Andes, in the south of the province of Neuquén, in Argentina (Figure 1).

The main criteria in Table 1 are used to validate the choice to recover, conserve and return to the community this kind of construction.

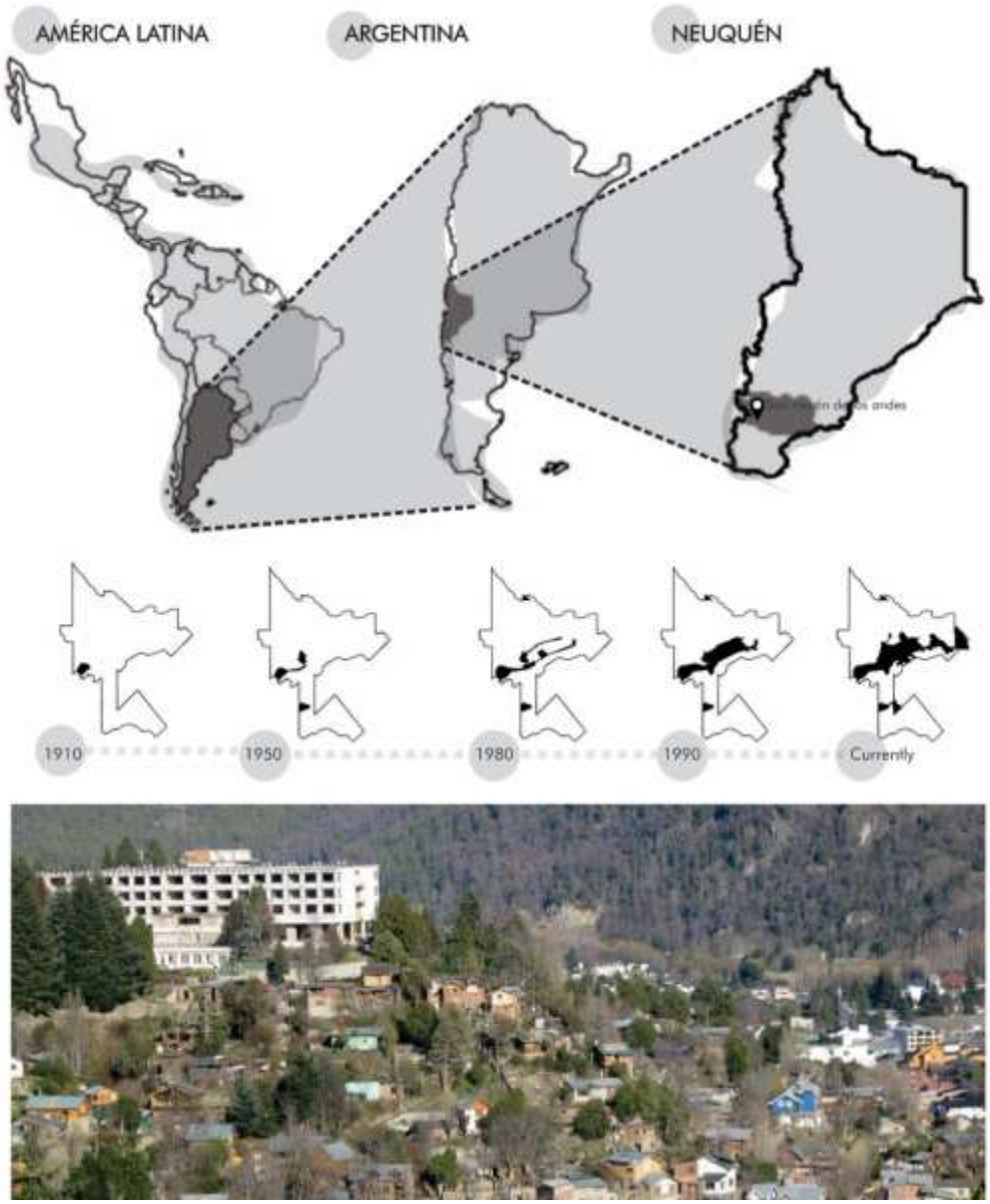


Figure 1. *Geographical Location of San Martín de los Andes and its Evolution over Time*
Source: Drawings by Authors.

Criterion 1: Creative Work of Human Genius

Built in 1974 during the tourist development, the construction was a 5-stars hotel, with services, green spaces and recreation areas. The paradigm of 1980s Argentinean tourism was characterized by attracting tourists with greater purchasing power through luxury constructions that solved all their needs in just one place. At the beginning, the hotel had 72 rooms, 19 suites and apartments, with private bathroom, restaurant, lounge, solarium, swimming pool, cafeteria, bar, shopping mall, conference room and casino (Figure 2).

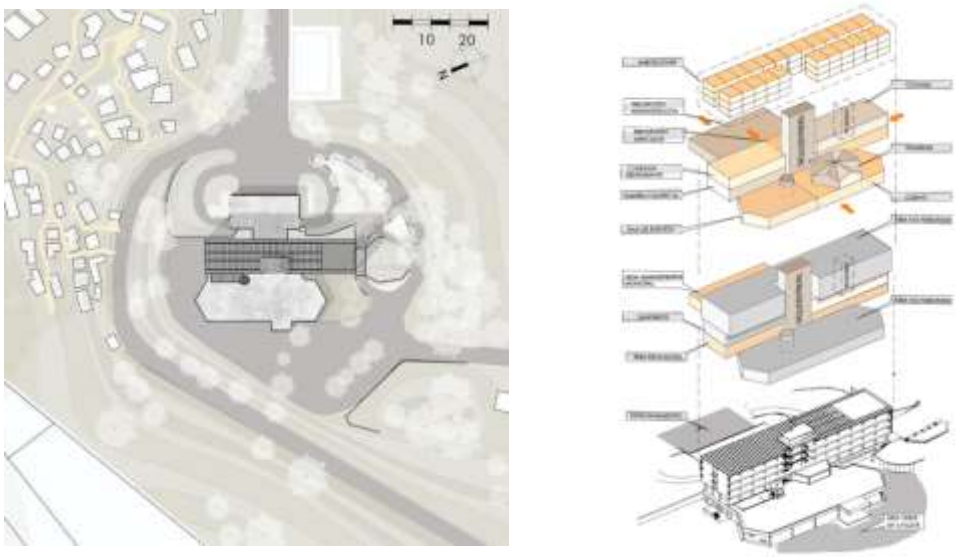


Figure 2. *Current State of the Hotel before Renewal Project*
Source: Drawings by Authors.

This building consisted of three big blocks of reinforced concrete. It was inserted in the middle of the mountain, joining with the existing topography, by generating several terraces that allow to appreciate all the beautiful views, above the high vegetation.

The hotel was built with the clear intention of highlighting and showing its luxury and, due to its size, it broke through the surrounding natural landscape, rising above the city (Figure 3).

In 2002 the municipality of San Martin, as a precautionary measure to resolve a confused network of commercial and tourist licenses, decided to close the hotel, by turning it into a province's property, so that any new decision had to be approved by the provincial government. In 2005 a private investor presented a project to restore the old structure, turning it into school and hotel. The walls and the floors were demolished, the furniture was removed. During the renovation, new external insertions were built, and some small structural reforms were made. After these works, never completed, the work was interrupted and the project was completely abandoned, with greater deterioration (Figure 4).

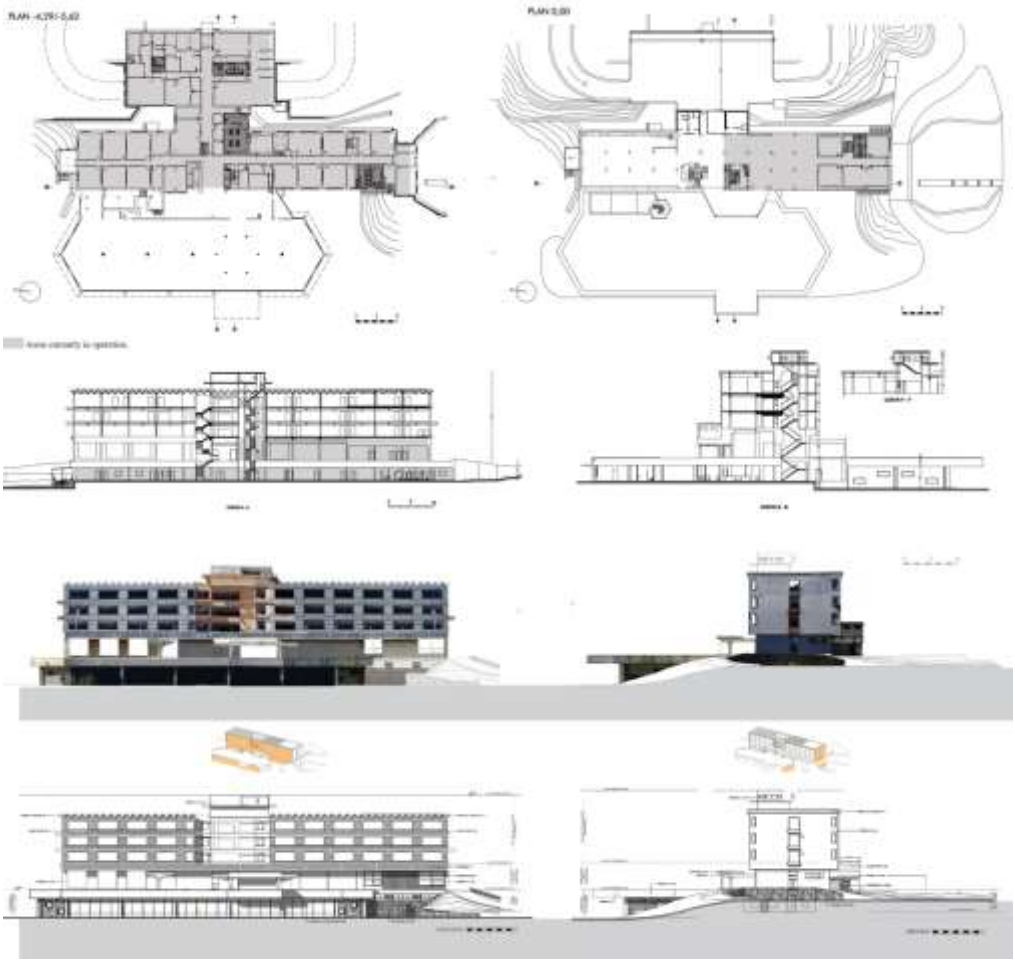


Figure 3. *Plans, Sections and Elevations before Renewal Project*
Source: Drawings by Authors.

In 2013, some activities of both Escuela del Sol and University of Avellaneda were allocated. About 1,200 m^2 were renovated, with new classrooms and spaces, modifying the original layout.

The paradigm started to change, from a touristic construction to one that produces knowledge by spreading education and culture within the city and for its inhabitants.

Criterion 2: Influence of Innovative Technologies

This construction was considered a landmark within the city, traditionally characterized by low-rise buildings, in wood, stone and brick walls. The hotel was the first building with a new language, with its concrete structure and its large size in the middle of the mountain. After its construction and due to the great criticisms received by the inhabitants, the municipality decided to propose clear rules for new constructions, thus avoiding the loss of mountain traditional image. These regulations established mandatory percentages of any materials, including wood and stone, and the maximum heights of buildings, which could not exceed 3

levels. Over the years, however, the hotel has become an iconic element easily recognizable, a real reference point for visitors and residents.

Figure 4. *Current State of the Building (Photo by Authors)*

Criterion 3: Exceptional Example Impressed in People Historical Memory

There were so many years in which the building was abandoned that few remember it in its magnificent moment. Today it is a product of the various transformations undergone over time.

However, for a long time it was not accepted by the community for its "break" with the surrounding landscape, but soon it became a city symbol impressed in the memory of citizens, almost a giant watching over the territory from above. Today the current face is well impressed in the urban landscape. By viewing the mountain and seeing how this large building stands among the vegetation, Hotel Sol de los Andes is a singular and representative element of a whole town.

Criterion 4: Illustrative Example of Economic or Social Developments

The hotel meant a big change: before its construction, there were no hotels of this size within the city. The hotel opened soon its doors as a national ski centre and an airport had to be built to accommodate tourists from all over the country. Many tourists, after their trip, decided to stay permanently in San Martin in search for peace and to escape from the metropolitan life. San Martin, therefore, has been positioned as one of the main cities nationwide, chosen by tourists, due to the Chapelco ski centre and the various activities offered thanks to its proximity to naturalistic ecosystems.

Today, a part of the functions of the Municipality are located on the ground floor with an occupation of 1,337.63 m^2, which corresponds to only 25% of the whole area. The upper floors aren't working because of their structural safety cannot be guaranteed.

Renewal Project

In accordance with the concept of holism in architecture, the proposed project is structured in 4 key interrelated points.

Society

San Martin de los Andes is characterized by the mixture between urbanized areas and nature, with a "main urban plant" corresponding with the historical centre, and many peripheral expansions. In 2018, *San Martín de los Andes 2030 Strategic Plan* began to operate with the aim of establishing clear policies for a sustainable development integrated with the strategic guidelines of the Province of Neuquén. The purposes of this plan are carried out through 16 strategic projects, including the creation of a new hospital, a recycling plant, a conference centre, a linear park, distributed within the city.

The site belongs to different entities, which are geographically linked in this area of intervention; both municipality, National Park and the Mapuche community have jurisdiction over this sector, with some conflicts between them. So, any new use must contemplate all these actors, by generating a construction with social equity. Close to the property there is Canteras district inhabited by 230 families and almost 700 residents.

In order to choose the new uses, an online survey was carried out to know the people opinion, by Google forms platform, easy to answer, with multiple choice and other sections to develop their answers and opinions. It was disseminated to the community, through the implementation of social networks shared by the official accounts of San Martin de los Andes. There were a total of 408 responses from people of different ages, social classes, cultural backgrounds and different professionals. Three main criteria were evaluated: Knowledge, accessibility and uses (*Knowledge*, level of information about the current state of building and site; *accessibility*, simplicity in accessing the site; new *uses* considered most relevant for the building. After elaborating the different answers, the decision was to generate a mixed program (Figure 5).

The building incorporates a civic centre to develop and promote local culture, university and cultural space. The pyramid of the local population shows a decrease in young people (18-35 years), who leave small towns to move towards more important cities with the ambition of obtaining a university degree. The new function has been validated in accordance with the check list for verifying the compatibility of new uses in existing buildings. The new intended use reaches the value of 18.5/23 points: very satisfactory (Figure 6).

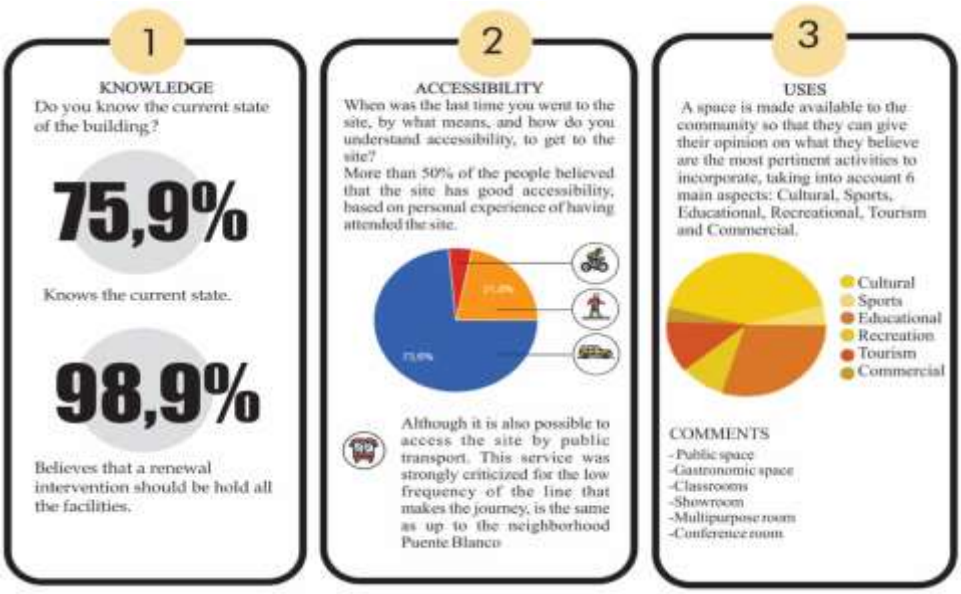


Figure 5. *Summary Table of the Web Questionnaire Made to the Community*

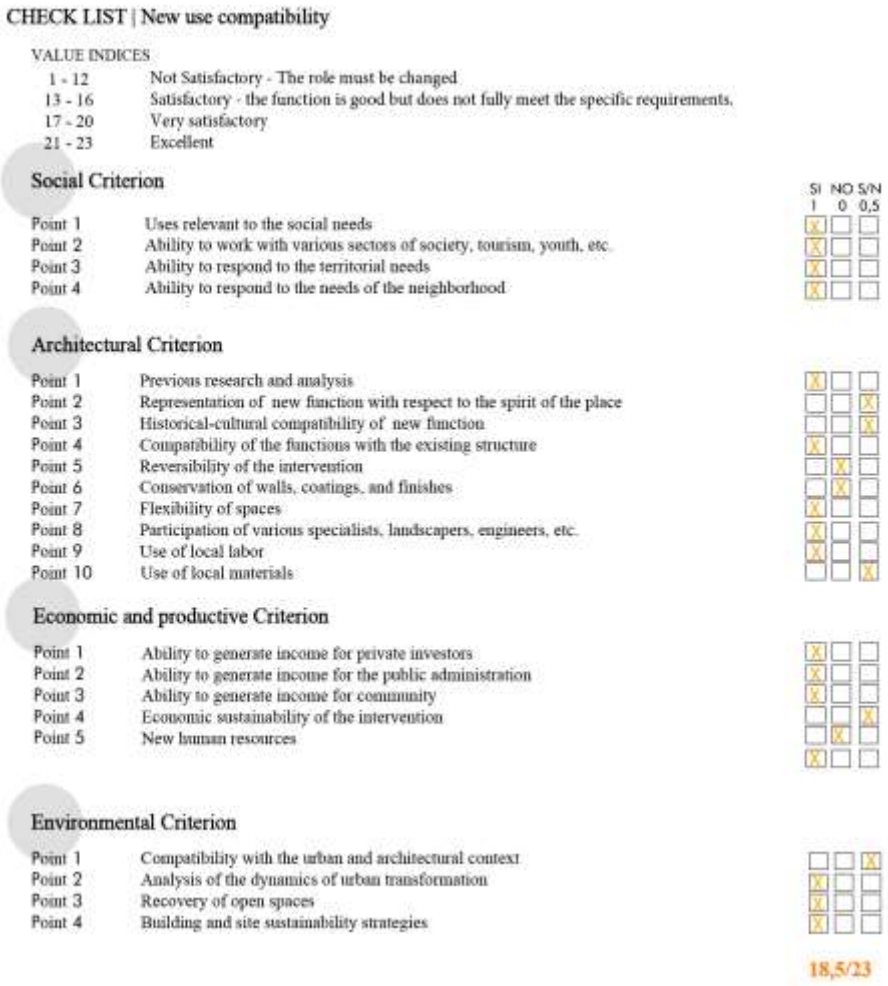


Figure 6. *Check List Useful to Verify the New Use Compatibility*

Architectural Design

The organization within the building was stratified in different levels. The civic centre is located on the ground floor, divided into 3 volumes: the first, corresponding to the access, houses a gastronomical area and it is complemented by a covered plaza for various outdoor activities; the second includes both the administrative area and the art and music rooms that have special requirements; the third contains all the activities that require movement, such as dance, theatre, body expression, etc. It also incorporates an auditorium for 200 people in which the stage can be used both indoors and outdoors. The media library is located on the first floor, as a link between the civic centre and the university sector. The following floors houses the university spaces (Figure 7).

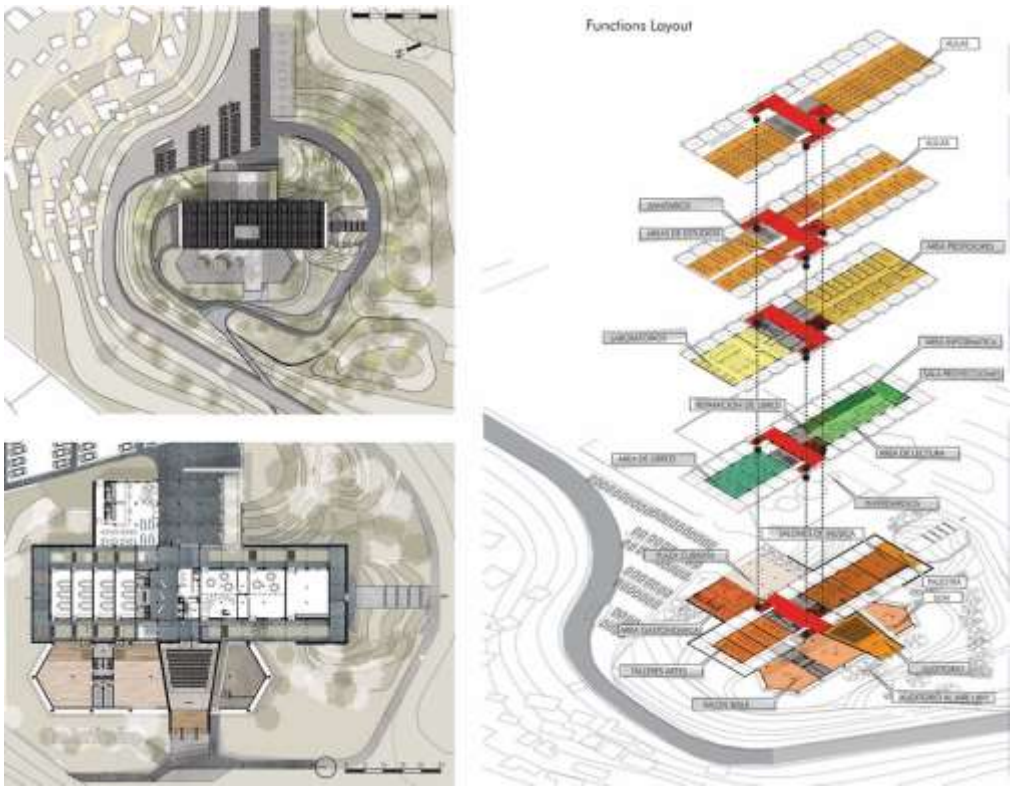


Figure 7. *General View, Ground Floor and Functions Layouts after Renewal Project*
Source: Drawings by Authors.

A new structure is integrated into the architectural design. This new structure allows to generate transition spaces between the different volumes, incorporating a spatial aggregate, which allows the subdivision of the different functions and the horizontal and vertical circulation of users (Figure 8).

Structure and architecture merge to form a new language, generating a new imprint in the landscape. Using the modulation of the previously designed structure and taking into account the local solar map, we found an average angle of 52 degrees that allowed us to work on a surface that lets to filter the direct radiation of

the sun during the summer season and exploit it in winter. The 100% recyclable textile technology allows to dissipate up to 95% of the heat in summer, saving up to 50% in cooling costs. The contemporary language does not disguise itself in the context but stands out as well as the original building. The white finish allows it to be used as a screen on holidays (Figure 9).

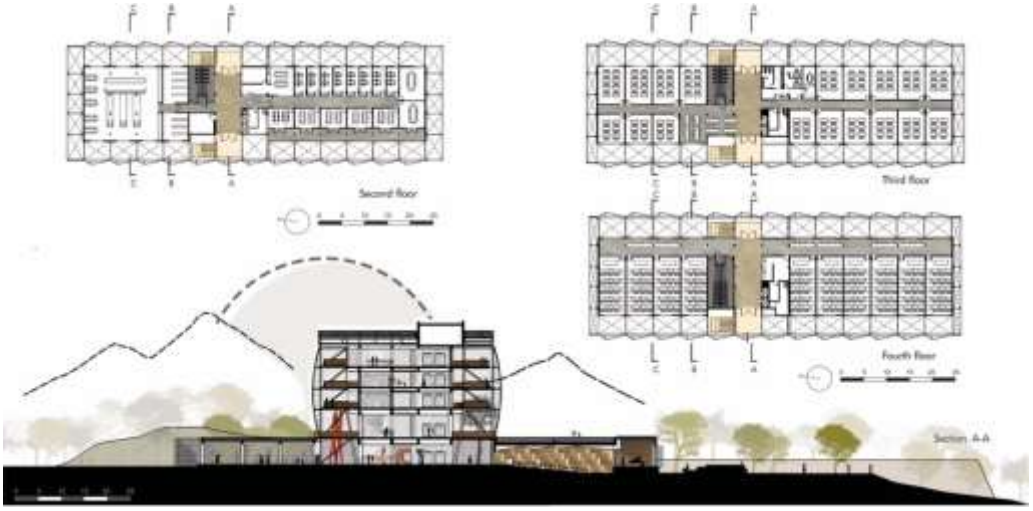


Figure 8. *Project Plans (Second, Third and Fourth Floors) and Sections*
Source: Drawings by Authors.

Figure 9. *Project Exterior and Interior Renders*
Source: Drawings by A. M. Santoro.

Structure

In July 2015, the Municipality of San Martín de los Andes commissioned a technical report to evaluate the current state of the structure. Non-destructive tests

were carried out to determine the quality of the concrete, the quantity of steel and the arrangement of the reinforcements of the resistant elements. This information was the basis for this work.[14]

The structure is mainly composed of three volumes, two with only one level and the third with five levels. Due to its characteristics, the highest building is the most structurally compromised especially for its poor performance to the seismic forces. Therefore, it was decided to base the study on this portion. The resistant structure is made up of columns, beams and solid slabs. The upper rectangular part is divided into three blocks separated by expansion joints. The columns and beams form porticoes in both directions with variable height sections.

It was performed a pushover analysis, i.e., a non-linear method. In general, the structure capacity depends on the strength and deformation capacity of each of its individual components. In order to determine the capacities after the elastic limit, non-linear analysis procedures are necessary. This process was carried out by the software SeismoBuild, able to predict the displacement behaviour of spatial frames under static or dynamic loads.

In conclusion, the torsional stresses presented in the elements are not very large, helped by the plan regularity and to the disposition of its structural elements. The structure is capable of supporting gravitational loads, but it cannot resist seismic loads.

It is proposed to generate a metal great rigidity exoskeleton to absorb the seismic loads avoiding reinforcing all the connections. The structure, integrated into the architectural design, solves not only the structural resistance but also environmental and functional comfort issues (Figure 10).

The methodology to carry out this seismic study is a theoretical method that considers the seismic loads as unidirectional, taking into account the two directions of analysis to find the necessary stiffness, simplifying the calculation method. It is important to consider the connection between the two configurations: the existing reinforced concrete structure and the new steel structure. It is possible to work with a rigid horizontal plane, which guarantees the uniformity of the loads. This plane was generated thanks to the implementation of a horizontal beam that will be mounted under the existing ones.

14. Only a small part the structural analyses is reported here. They were conducted under the supervision of Professor Gianvittorio Rizzano and Engineer Massimo Latour, Department of Civil Engineering, University of Salerno.

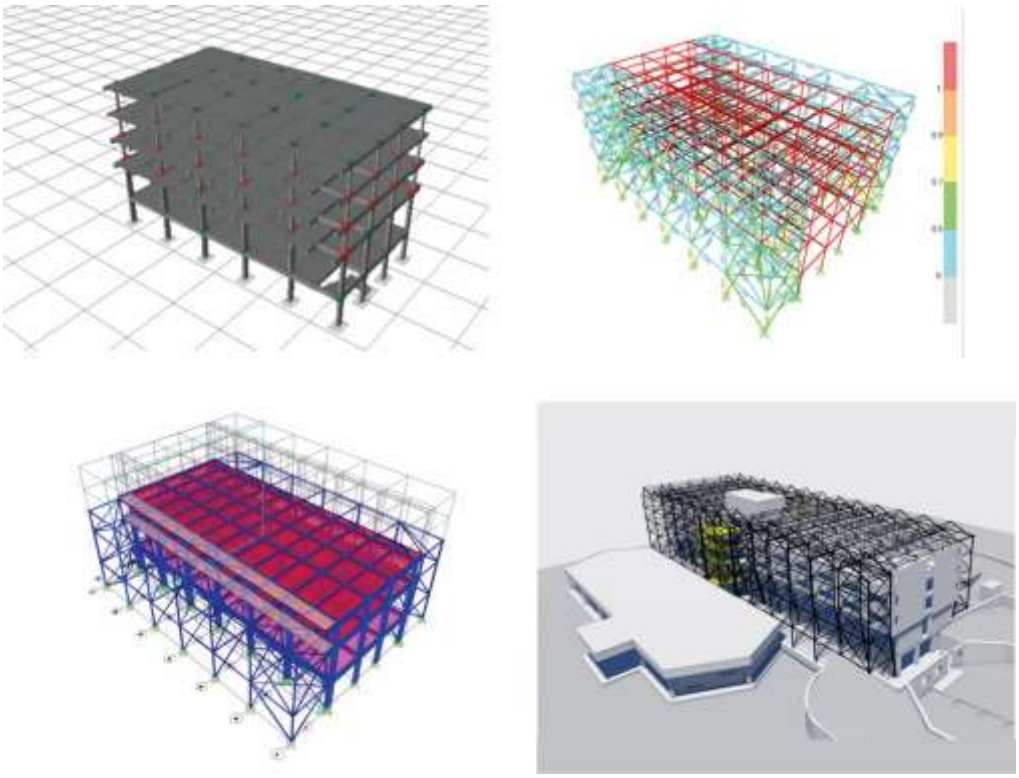


Figure 10. *Structural Development of the Proposal: (1) Feasibility Study on the Nodes (2) Modelling of Structure (3) Verification of Sections (4) Final Proposal*
Source: Drawings and Calculation by A. M. Santoro.

This new beam will be responsible for resisting the loads applied by the vertical planes on them and transmitting these actions (Figure 11).

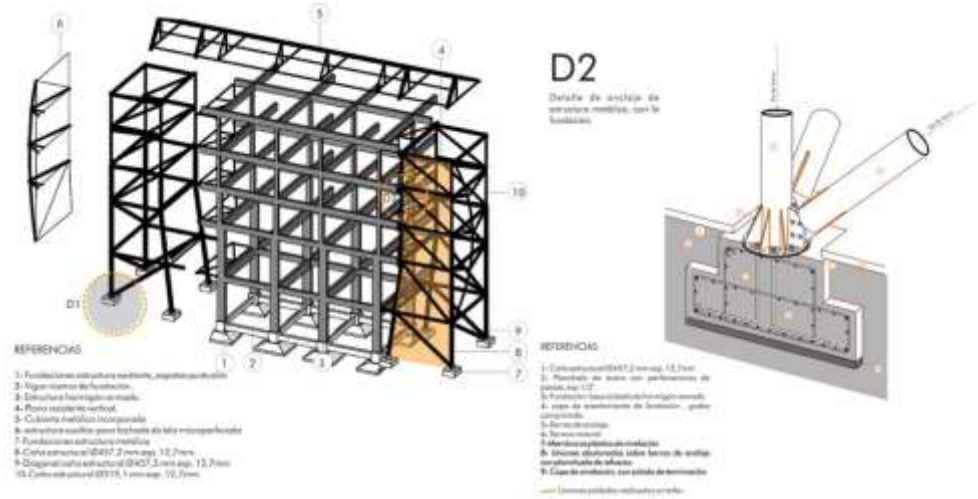


Figure 11. *Details of the Main Connections Post-Project*
Source: Drawings and Calculation by A. M. Santoro.

After modelling the whole structure with SAP2000, two pertinent verifications were performed. The first was to verify that the steel sections do not

creep under seismic loads, according to the limits set by the regulations; the second was carried out by checking the movements of the structures in both the directions.[15]

Sustainability

Nowadays, sustainability is one of the most important parameters to take into consideration, assumed as the capacity to reduce waste and to use natural resources. For this reason, three systems that work simultaneously were designed, allowing the project to become self-sufficient (Figure 12).

The first system is the use of solar energy with the implementation of photovoltaic panels, incorporated at the end of the metal roof. The energy collected is used to power the building electrically and, in the winter period, is used for the operation of boilers, which operate a radiant floor system.

The second system contemplates the reuse of rainwater. The water is collected by a system of gutters placed on the roof and conveyed to filters, to then be accumulated in a tank located on the ground floor. Finally, the shape of the designed facade allows us to take advantage of the winds of the area and to obtain the correct ventilation of the whole proposal.

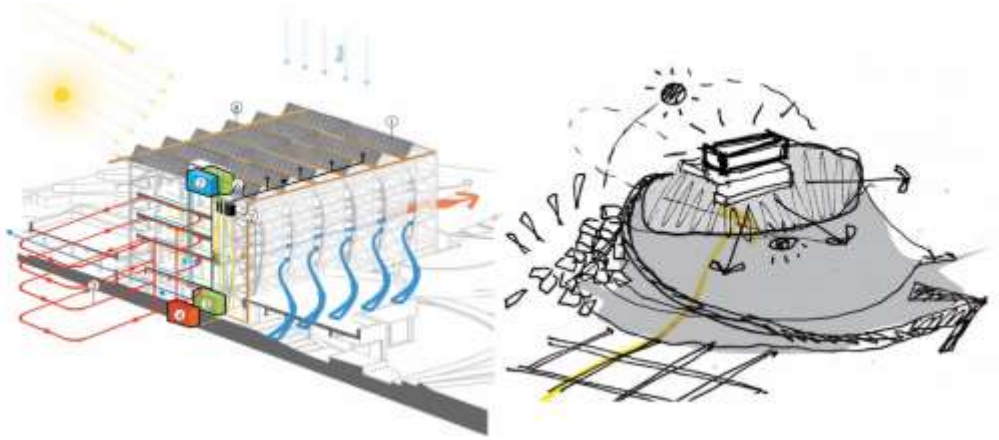


Figure 12. *Functioning of the Systems for the Use of Natural Resources. Use of the Sun's Energy (1,2); Heating with Radiant Floor Systems (3,4); Reuse of Rainwater (5,6,7,8)*
Source: Drawings by Authors.

Furthermore, the sustainability aspects in the building are classified into four groups of environmental, social, economic[16] and technical issues.[17]

15. The structural analysis has foreseen numerous verifications that it is impossible to report in this scientific contribution, since it is intended to demonstrate mainly the effectiveness of the holistic approach in architecture.

16. The economic aspects are identified as follow up research areas.

17. See H. Zabihi, F. Habib and L. Mirsaeedie, "Sustainability in Building and Construction: Revising Definitions and Concepts," *International Journal of Emerging Science and Engineering* 2, no. 4 (2012): 570-578.

If the cultural asset is recognized as a non-renewable and limited resource, then its conservation and safeguarding become a priority needs of the community. Recovery and enhancement of the existing that opposes the consumption of resources and soil is a sustainable operation in itself.

The key issues for achieving the goals of sustainability, especially linked to the recovery of existing heritage, are:

1) Socio-cultural progress that recognizes everyone's needs.
2) Effective protection of the natural and built environment.
3) Recognition of the historical value of the buildings.
4) Prudent use of natural resources.
5) Maintaining high levels of economic growth and employment.[18]

To conclude the project phases, in order to enhance social sustainability, a final questionnaire was administered to the inhabitants of San Martin de los Andes who, after careful examination also thanks to virtual architecture, were able to express their opinion (Figure 13).

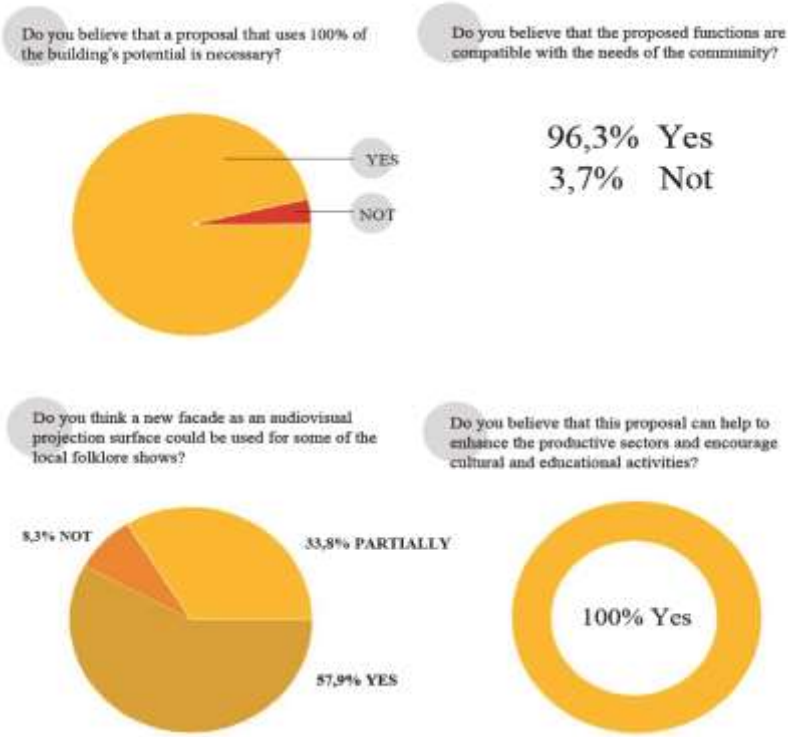


Figure 13. *Final Questionnaire on the Appreciation of the Project by the Citizens*

18. See G. K. C Ding, "Sustainable Construction, the Role of Environmental Assessment Tools," *Journal of Environmental Management* 86 (2008): 451-464; J. Hwa Bay, "Towards a Fourth Ecology: Social and Environmental Sustainability with Architecture and Urban Design," *Journal of Green Building* 5, no. 4 (2010): 176-197.

Discussion and Results

This work outlines an ideal and operational method based on a) preliminary selection of modern buildings to be conserved, restored and reused; b) careful validation according to the 4 evaluation criteria; c) design practise based on the holistic approach; d) participation of population in any stage of the process.

A validation of the methodological coherence is concretely conducted through a case study, in particular with the aim of recovering and redesigning a giant concrete building in San Martin de los Andes (Argentina).

In general, it is suitable to use the following analysis and intervention methodology.

Each building must be analysed through the four criteria: 1. creative work of human genius; 2. influence of innovative technologies; 3. exceptional example imprinted in the historical memory of people; 4. illustrative example of economic or social developments. It is essential to generate a critical appreciation of the quality of the work, through broad and effective selection criteria, so as to be able to orient the choices towards more careful intervention.[19]

Subsequently, an interdisciplinary recovery project is proposed, in accordance with the four main components of the architectural project. The contemporary project allows to preserve and maintain the existing building avoiding losing a key construction in the history of the city and the local landscape. At the same time, it allows to generate new comfortable accommodations and transition spaces between the different volumes, to divide the different functions and to organize the horizontal and vertical circulation of users. The choice of selection criteria and holistic aspects is able to express all the social, cultural, architectural and urban effects involved in the design and construction of a work.

The structural components must preferably be analysed by non-destructive tests in order to define the mechanical parameters to be adopted to perform the structural evaluations (in this project, a metal exoskeleton with high rigidity was designed that solves structural and functional problems, becoming a peculiar figurative feature of the artifact).

Moreover, each project must be treated according to an all-inclusive approach in which any aspect cooperates to achieve the final objective. It is recommended to use the 4 selection criteria during the analysis phase of the works and, subsequently, the 4 inclusive parameters (society, architectural design, structure, sustainability) in the conception, design and realization processes.

The methodology could be extended to numerous examples of modern architecture, so as to create a map of buildings worthy of being recovered and preserved. The 4 selection criteria ensure compliance with art. 1 of the Venice Charter for which all the evidence of a particular civilization, a significant evolution or a historical event must be preserved and protected. This notion applies not only to great monumental works but also to those which gained a cultural significance over time.

19. See MacDonald, "20th Century Heritage: Recognition, Protection and Practical Challenges," in *ICOMOS World Report 2002-2003 on Monuments and Sites in Danger*, 2003.

Conclusions

Holistic approach to recover the existing buildings means to manage the intervention, according to the uniqueness of each construction and ensure its enjoyment over time, through compatible, reversible and distinguishable solutions.

The conservation of 20th century production includes the analysis of the ambiguities related to the modern techniques and purposes. In fact, according to numerous positions, contemporary production is absolutely not comparable to that of past artistic and constructive seasons, because it is not made up of unique, unrepeatable and unreproducible items, but of serial and industrial combinations. The theme of "seriality" did not allow the protection and conservation of many works which, due to their more modern and industrial character, seem to require easier solutions and, above all, more rapid reproducibility operations. These reflections certainly do not consider all those aspects that construction techniques or new materials generated in the creation of the "modern".

It is necessary to overcome the ambiguity of the modern architecture linked only to industrial production and economic speculation, in order to evaluate all the examples on a case-by-case basis and to provide the same care reserved for Medieval, Renaissance or Baroque buildings. This makes possible to overcome any issues related only to the composition/decay relationship of materials or to the maintenance of each elements. With regard to modern production, pre-packaged solutions cannot be implemented, but the formal and technological peculiarities of the modern buildings require wider reflections that can bring the practice back to the methodological rigor typical of conservation and restoration discipline.

Today architectural conservation/transformation/maintenance cannot ignore the challenges evoked by an emerging awareness of cultural and operational change towards more sustainable goals of efficiency, efficacy, safety and functionality, without neglecting ethical and aesthetic demands.

Therefore, it is necessary to address these issues in an interdisciplinary scientific approach, so Academies, Institutions, professionals and communities will be able to reactivate the cultural debate that has made possible to preserve the historical heritage over time and to conserve and recover the modern production, rich in tangible and intangible values.

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