IT Tools for the Valorisation of the Building Heritage

Analysis and reuse of rural buildings to improve cultural-tourism activities

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Abstract: According to the valorisation of sustainable policies, many European countries developed common or individual strategies to preserve and exploit their environmental and building heritage. Through the VILLAS transnational project it has been possible to create a set of specific tools, focused on different user types and needs that are easy to be combined and applied to assess and valorise private and public building heritage.

1. INTRODUCTION

According to the valorisation of sustainable policies, many European countries developed common or individual strategies to preserve and exploit their environmental and building heritage. At the beginning of 2004 the EU co-funded the three-year program VILLAS\(^1\) to promote a common strategy to preserve and upgrade the building heritage and its related landscape, enhancing them as part of the European cultural and historical identity and in a framework of sustainable development.

Changes in life-style, fragmentation of landholdings and a lack in private and public funding can be considered as the main obstacles for the conservation of the building heritage. These problems are often coupled with

a short tourist environmental promotion and scarce local and national incentives (for investment, sale and maintenance). Management policies for historical buildings need to be reviewed, both in theory and practice, positive spurred by the “translation” of economic strategies commonly used for private investments and the application of IT systems for the environment planning. IT tools give a strong support to manage information, to coordinate diagnostics activities, to guide the design planning, to facilitate public/private partnerships and to communicate manifold data.

The VILLAS project, focused on developing regional innovation strategies together with local policies, deeps large scaled objectives as the promotion and preservation of cultural heritage, the deepening of regional identities and the maintenance of natural and building heritage. The innovation of this program is overcoming the traditional fragmentation in managing and promoting the historic environment, providing an exportable model to integrate different transnational areas, therefore manifold stakeholders and potential investors.

The research area is the “CADSES” one, where is possible to find similar issues both about building decay and growing interests about new policies for the reuse and valorisation of the heritage properties.

This program includes sixteen partners from four Countries (Italy, Greece, Austria and Croatia), representing the set of stakeholders normally involved in the heritage preservation of a large European architectural estate.

The Italian IRVV would like to exploit its large heritage of Palladian villas, the IBACN is searching for a new environmental outlook about the management of its gardens and villas inheritance and the Austrian region of Carinthia needs to valorise its castles.

Through the VILLAS project local administrations search for a new strategy to promote sustainable tourism, to exploit their building heritage and to support innovative working opportunities, this is the example of the Italian regions of Veneto (leader partner) and Umbria, of the province of Campobasso, the municipality of Corfù (Greece) and the Croatian involved counties (Zagreb, Krapina-Zagorje, Varasdín, Pozega-Slavonia, Koprivnika-Krizevci), coordinated by the Faculty of Architecture of Zagreb.

The Italian Universities of Ferrara and Trieste use their specific knowledge about building refurbishment, IT tools and economic assessment to support the Villas goals and to enlarge their potential through the research fields and the chance of making practical surveys.

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2 CADSES: Central European Adriatic Danubian South-Eastern European Space [www.cadses.net].
3 IRVV: Regional Institute of Villas of the Veneto.
4 IBACN: Institute of Cultural Heritage of the Emilia Romagna Region.
2. **A DSS FOR THE BUILDING HERITAGE**

2.1 **The definition of a common Decision Support System**

All the analysed heritage assets are facing a different typology and degree of risk, from congestion and abuse to environmental damage or destruction. The proposed VILLAS system has been studied to define a compatible re-use strategy, according to the planning criteria and spatial policies of the EU research area and enabling to operate on a great diversity of protected built environment typologies (i.e. villas, gardens or rural buildings).

The intensive relationships and interdependencies that emerged between the international project partners showed that it’s possible to manage a social and economic integration based on sharing common problems and opportunities, improved by the definition of strategic networks and common tools. Each project partner (PP) has limited skills and purposes, due to his own knowledge and to the mission of his organisation (administration, research, education, etc), but through the transnational research activities this heterogeneity became a resource. It has been possible to develop specific systems (to analyse, assess and redesign the building heritage) but organised as a set of tools in spite of focusing on different target groups and user needs.

According to these manifold features, the VILLAS strategy is made of different kind of tools; these systems have been studied to be easily combined, to be adapted to the cultural and economic attitude of each specific regional framework. The VILLAS decision support system (DSS) is a set of preferred assessing and planning tools, focused on evaluating the best building use in perfect agreement with its cultural and architectural value and with the economical investment that has to be done. By choosing the building heritage as the DSS case study all the IT opportunities have been exploited to manage the subtle relationship that rise from the necessity to preserve the building environment but also to maximise the needed works, controlling costs.

Some of the VILLAS tools have been developed just by one of the PP (using the common VILLAS knowledge) but promoted through the common project media (conferences, website, etc) and used by the other partners as best practices, case studies or a chance for new common projects. The Carinthia region, in example, designed a set of digital and paper flyers to promote their castles and tourist routes, but these thematic guides includes best practices and project references chosen from the international VILLAS ones, searching for an overall view of the cultural offer.
A second set of tools has been made to collect, analyse and share the information gathered by all the involved partners, therefore it can be considered as a transnational Decision Support System, including:

- a web-site (see Figure 1) and a web-GIS, used as common information framework (see Figure 4);
- a transnational mapping system, the GIS (see Figure 5);
- a property questionnaire to evaluate the building attributes (from dimensional to environmental features) and to collect the owner requests;
- a building survey made of a set of matrices to assess the planning priorities (to be submitted to a panel of experts) as regard building vocationality and the sustainability of the reuse proposals.

These tools have been strictly related, comparing their specific results and information, and linking preferable design choices with the building environment and boundaries.

These multi-criteria systems have been realised using the collected data (as a statistical database), studying the refurbishment strategies of a list of international best-practices, relating local regulations and national tourist and reuse policies. In this way the design proposal is not unique but it can be
associated to the moving of its “scenario”, that is the changing of planning priorities (as costs, times, dimensions, etc).

Starting from the existing methods to collect information it has been developed the VILLAS questionnaire (the main VILLAS survey), organised to manage a large number of parameters, according both to the transnational objectives and to the specific research requirements of each project partner.

The questionnaire is made of eight main focuses:

- Characteristics of the place (position, accessibility, infrastructures, landscape, economic and urban features)
- Typology and original elements that can identify the building (typology, dimensions, main building features, organisation of the building estate, historical and architectural factors)
- State of maintenance of the building (poor fair or good about the most important technical systems)
- Ownership (property constraints, public/private relations, etc)
- Current or previous use of the building (type, use level, criteria driving the use, etc)
- Profitability of the economic activity actually host in the building (income, dimensions, client targets, etc)
- New preferred use of the building for medium-long dated projects (criteria driving the use or change, regulations, costs, etc)
- Characteristics of the current and the hypothetical alternative uses in the building (comparing different building uses proposed both by the property and by the partner that make the survey).

Having a look of the Villas questionnaire it’s possible to distinguish between to different kind of information: objective and subjective. The collection of data about the state of the art (objective facts) allows to create a map of the case studies and to schedule them for planning purposes. The analysis of more subjective features (as design proposals, cost projections, etc) is undoubtedly useful to address the “reuse” phase, recording some property attitudes (to sell, to enlarge, to change the building, etc) and suggesting large scaled planning strategies according to them; see Figure 2.

The results of this large assessment of the VILLAS buildings have been used by each partner to evaluate the selected case studies, verifying how many features can hinder or facilitate both the survey procedure (maps, drawings, etc) and the chance of reuse of the buildings (regulations, costs, property attitudes, etc).
Figure 2. Example of the collection of data (excel files) through the interactive database.

Through the questionnaire it have been realised two other different VILLAS tools: the comparison matrices and the GIS scheduling system.

2.2 The tools for the building assessment

Starting from thousand of data collected through the questionnaire, it has been possible to create a list of preferred relations between building features and it’s attitude to be reuse in a short or long term.

The Ferrara research group, according to its knowledge about architectural and technical matters, it’s elaborating a scheduling of the case studies (now limited to the rural typologies), underling the elements that can affect the use, reuse, refurbishment and re-design of the buildings, referred both to their use destination and to the construction/cultural features.

The University of Trieste (another Italian research partner) is selecting sensitive bench marks (as sustainability or reuse vocationality) to guide each potential planner or investor in searching the best project options. These matrices relate a number of building variables (as architectural typology, fine
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arts attributes, etc) with others socio-economic indicators, as the area, user requirements and other parametrical features useful to guide the proper building valorisation. Through the analysis of hundred of buildings (all the VILLAS case studies) and of many successful economic reuse plans (chosen by the Project Partners), it has been possible to estimate value functions in order to determine the proper contribution of each variable in achieving the expected goals (see Figure 2).

![Figure 3. Example of weighting parameters, associated to the questionnaire results.](image)

Each building included in the VILLAS survey has been described by a number of variables, that represent the matrix columns; in example: architectural typology, fine arts attributes (such as marbles or frescos), gardens, services. Social and economic indicators referred to the area (infrastructures, distances, land use, etc) can be analysed both as simple data include in the basic building matrix and as a bench mark to define relationship between the building and its reuse capability.

The analysis matrix requires the definition and elicitation of preference criteria and relative weights. Analysing a number of successful economic reuse cases, value functions will be estimated in order to determine the proper contribution of each variable in achieving the planning goals.
main research hypothesis have been also verified proposing some simplified “scenarios”, made comparing some preferred assessment matrices (dimension/costs, land use/building reuse, maintenance status/building redesign, etc), to a transnational panel of experts. This group of experts (technicians, administrators, designers, etc), responsible for different building planning/design stages, share their knowledge by giving their (quantitative) opinion on the role of certain preferred parameter combinations to the reuse opportunities.

This assessment activity will allow the definition of economically sustainable reuse evidences, while tracing the model connecting all the variables to the project goals. To verify the final results of this stage it will be defined a set of detailed reuse programs (for some chosen case studies), analysing the difference between the expected results (using the assessment matrices) and the real cost and time goals achieved by each designed alternative solution.

The valorisation of the existing building heritage is an objective that have to be reached with the promotion of the affordable management of the cultural and architectural policies, encouraging public/private partnerships. The VILLAS system is organised as a network between both “users” and “suppliers” and they continuously empower the system with new case studies, requests and information, improving the tools and the reliability of results.

2.3 The GIS and web-GIS systems

The data collected by each Project Partner, through their main activities and on site surveys, have been resumed onto a GIS web site made of both traditional geographical mapping systems and of more interactive webpages (see Figure 4).

I order to join the complexity of the research objectives and to communicate the collected information to a large set of potential users (Public Administrations, investors, tourists, etc), the VILLAS IT tools have been co-ordinated through this web site, arranged into a private and public interface. The “confidential” web access is dedicated to the research partners and it’s normally used to show and manage the information. The “open” web interface allows the data spreading, enabling transnational virtual tours between all the buildings fit into the GIS database and it shows the VILLAS tools, encouraging new partnerships.

The IT systems have been used to translate all the research information into a mathematical model (for the GIS data organisation) and into an alphanumerical structure, to convert the building surveys into an integrated web visualisation. The publishing system is managed by a web server that
works as http daemon and it runs the server side language. In this way it’s possible to handle a spatial and alphanumerical database, both as local or remote connection.

The cartographic program is an image server that generates standard web images that can be shown through a common browser, starting from raster or vectorial plans (the heterogeneity of basic data mirrors the blend of research partnerships).

The building showing through GIS maps allows to verify the context and to better understand distances, land features, the relation with infrastructure and services and to be able to arrange a simple virtual tour or, if needed, to design large refurbishment plans (land marketing).

The web system is enriched with aerial and satellite photos (subjected to the specific privacy policies of each research partner), that give the chance of
customise the information and to have a more friendly impact over the unprofessional users.

The use of a software integrated into the GIS database allows to create a topological tool, combining the SQL language with spatial instructions, therefore ensuring both a geo-graphical virtual sailing and an alphanumerical approach. The GIS system allows managing the data, searching information or creating a set of thematic maps or lists.

Figure 5. Example of a GIS mapping of the VILLAS collected case studies.

The GIS data collection as been made handling together commercial and Open Source softwares, according to each partner needs, generating a final common file, ready for the publishing.

To make more readable the data sharing just a selection of the complete survey database has been included onto the GIS system as references, including a homogeneous classification of the chosen case studies (building code, name and address, the typology, etc). The research partners have,
naturally, a special licence to visualise and edit all the complete VILLAS data (shape files, maps, databases, etc).

The public web area of the GIS system shows the Villas purposes and tools and can be used to test the DSS itself (inviting people to join to our EU project) and to make tourist maps and tours through the VILLAS Countries, having a look of selected case studies. It includes: Country maps, basic GIS mapping info (roads, towns, etc), the basic shape files (with the some building details, needed to fit them into the geographical references) and some other cultural information. According to the typical needs of “public” users (i.e.: having more historical or tourist info, visualise photos, drawings, etc) the GIS webpages have been enriched with downloadable files (connected to the case studies), with search toolbars and links to some related websites.

The restricted web area has to be used just by the Villas partners to manage the data and to use them to organise and show new transnational proposals for projects of building renewals or the development of related planning programs. It includes: deepened GIS mapping info (geographical covers, etc), satellite photos, the complete building survey and any other collected documentation about the building (photos, drawings, sketches, artistic information, etc). To deepen the analysis and promotion of reuse activities, the selected VILLAS case studies have been associated with a short list of parameters that can be useful to select the preferred refurbishment plans and, just for pilot buildings, also a detailed cost/benefit study of designed proposals.

This web structure associated to a GIS mapping systems is opened to further implementations, as an example with tourist information (restaurants, hotels, etc) or thematic tours (cycling, walking, etc).

3. **THE RURAL HERITAGE AS A CASE STUDY**

Since before the Roman empire, when Etruscan people lived near the Po river, the Emilia Romagna region is characterised by farms and rural activities. This land use has been maintained until the middle of XX century, when the green image of the region changed, day by day, in a confused mixture between urbanised and abandoned areas. Rural buildings have been predominantly erected for agricultural purposes, this means that where farming practices changes or move these heritage estate is no longer required for its original use or has to be suited to modern farming needs and additional services (hotel, commerce, restaurant, etc).

Rural building reuse is subject to a framework of rules common to all building constructions, balancing private interests with the well-being of the
wider community and environment, diversifying the wider rural economy and improving the local tourism activities. Choosing the rural courts as a VILLAS research field, the group of Ferrara would like to enhance this building heritage, defining some needed boundaries to disrespectful projects, together with exploiting the reuse and refurbishment opportunities.

Planning parameters that actually safeguard the natural environment seem too strict to allow the development or modification of traditional farming policies and, in parallel, the urban designing rules cannot control the strict dependence between the rural building and its surroundings.

The importance of a new planning policy has been already discussed by the local Public Administrations that are overrunning the traditional general town planning through the creation of province Structural Plans, forcing the approval of each project to a larger overview of heritage saving and public benefits. This planning strategy is trying to change the relation between public and private projects, enhancing the “orchestration” as key word; but how evaluate the advantages (in terms of social, economical and cultural benefits) of each new design proposal? And where are the boundaries between private rights, the safeguard of green lands and the need of guarantee a support to the economical development of rural areas?

Public administrations generally use the building surveys procedures and the geographical maps update (i.e. dwg ones), just as tools when carrying out new large city plans. In this way the role of the surveys is marginalised to a mere control of the state of the art, leaving to subjective (and desultory) estimations the assessment of what and how designing and changing, day by day, the rural heritage. The diffusion of satellite photos and of GIS mapping systems is, fortunately, modifying this lack of information, but the quantification and qualification of each land or building abuse and the definition of large neglected areas don’t give specific indication about how to promote a design change.

The British experience can be considered as a good example of protection of the rural environment, controlling the design stage both as economical opportunity and a land safeguard. The County regulations in UK recommend the proposal of a reasonable business conversion plan together with the traditional design project, this to evidence how economical and social benefits can counterbalance the refurbishment building works, without major or complete reconstruction.

In Italy both investors and owners have actually a lot of difficulties to manage the proposal of new appropriate building destination and to finalise the design according to the safeguard regulations of land and architecture. Local authorities are interested in founding available resources and in co-ordinating large scaled plans to provide successful rural conservation policies but, on the other hand, private owners need to share the aims of
these public choices, having a suitable support in terms of organisation and economical incentives. The effectiveness of the proposed VILLAS tools can be measured just verifying the balance between the analysis of existing building and the assessment of suitable reuse proposals.

According to this methodological approach, applied to the rural building estate, the research unit of Ferrara developed a set of strictly related tools to include all reuse features (and stakeholders) as a global integrated process. These tools can be summarised as:

- a grid to easily examine the rural estate (simplified survey for large planning or tourist mapping), through a set of defined parameters, selecting a first short list of features: dimensions, number of building, uses, number of floors, rural court typology;
- a larger survey list (pre-design analysis), including more technical questions: traditional technical elements (roof, floors, frames, etc), state of maintenance, building typological features;
- a comparison matrix between the building use (existing and proposed) and some other critical performances that as to be joined (safety, health, accessibility, refurbishment costs, new installations, space for commercial or service activities, etc).

The combination of these checklists is well matched with two sets of in-depth studies: rural building technical schemes and preferred use destinations. The first document is a collection of traditional rural building elements, to help users to classify the typological and technological features of their properties and to do a simple comparison between standard performance and existing ones.

The second guidebook is a short anthology of the most appropriate uses in a rural context, addressed to many kind of commercial, tourist or recreational purposes. Each of these functions have been scheduled to include: boundaries and technical requirement, description of basic activities, preferred related services, key regulations, links with other support structures.

The given answers to the VILLAS questionnaire and the economical weighting systems proposed by the PP of Trieste have to be seen in parallel with this more technical survey, to elaborate a basic set of reuse alternatives then deepened with the on site technical survey. The relation between checklist and guidelines drafts a real DSS, helping to understand and qualify the physical conditions of all the aspects of rural building heritage. This is an essential basis for determining priorities for future actions, following different kind of design planning according to the specific objectives of each stakeholder.
This method, deepened for rural buildings, can be adapted to other building typologies just selecting their specific features and applying appropriate restoring strategies.
4. CONCLUSIONS

The VILLAS main result is to offer a framework to assess the potentiality of the building estate, relating the reuse opportunities to the variable features of each case study in its specific context. Building diversification is subject to a framework of regulation common to all improving policies, which tries to balance private interests with the well being of environment and communities, examined in a sustainable large scaled perspective. None activity has to be ruled out in principle but not all the existing reuse functions will be appropriate in all circumstances, they have to be checked according to the context and to general planning objectives.

The expected transfer of the VILLAS research outputs into the building heritage policies includes the support to public and private planners, suggesting a more focused list of assessment tools. Therefore each kind of DSS tool needs its own language, adjusted to the targeted users, and all the stakeholders have to be equally supported and addressed in their planning and designing choices.

The networking approach create the preconditions for the development of sustainable cultural heritage transantional tourism, promoting the exchange of information and the adoption of common methods to plan the building reuse.

The classification of potential economic uses, the definition of new typologies of legal restrictions, the upgrading of juridical instruments and establishment of common management methods have been developed to improve the effectiveness of resource allocation policies for the renewal and valorisation of the cultural heritage.

The VILLAS support system is therefore structured as a set of preferred tools and guidelines because the simplicity and adaptability of suggested reuse analysis and practices are as important as the correctness of the proposed solutions themselves. As regard the rural building heritage the provided tools can be summarised as:

- the definition of a on site survey grid to foster the readability of the rural court (building, open spaces and environment);
- the suggestion of an assessment model of the needed maintenance and refurbishment works, related to the functionality level of the building and supporting sustainable and traditional building methods;
- the promotion of guidelines that sum up the preferred uses for rural buildings, examining the existing boundaries to their application, the main references to local and national regulations and supporting associations;
- the definition of a short list of comments, useful for the local planning, through the suggestion of selected building features
(technological, typological, esthetical) that should be taken into account to constraint and address the reuse practices and to assess the affordability of a proposed design solution;

- the availability of a GIS updated mapping system that resume a large part of the existing rural court county area and that can be easily developed through a more large building survey and the integration of existing local mapping system (town plans, tourist maps, etc).

The VILLAS networking ensures the dissemination of the outputs and the enlargement of the project boundaries through the involvement of many different stakeholders; but the analysis of the building heritage is just a part of the process for its preservation. The final results of the VILLAS research activity underline the unavoidable role of communicating the collected information (using traditional and IT tools) and sharing the assessing methods to help a large public access to the practices of sustainable use of the heritage estate.

5. REFERENCES


