

INTERDISCIPLINARY PARASEISMIC CONCEPTION AND REHABILITATION OF THE CULTURAL HERITAGE IN SMALL VILLAGES. WORKSHOPS WITH STUDENTS ON SITE.

Wilquin Hugues /Belgium

Engineer Architect, Polytechnical University of Mons
Professor, Ecole Centrale of Life

Since 1991, specialists of safeguarding and rehabilitating the heritage on old sites under the danger of natural risks, and more precisely of seismic risks, met in a network, component of the group PACT of the European Federation of Networks (F.E.R.) placed under the aegis of the Council of Europe. This component PACT 19 (A) gathers geophysicists, geologists, structural engineers, building engineers and architects...all of them professors of universities or schools of architecture or researchers who were coming from Belgium, Spain, France,, Greece and Italy. Among the activities of the network (lessons, researches,expertises,...), these seminars-workshops of summertime in Europe brought together, since 1994, students and professors around nine study cases , nine seminars-workshops where the work was organised from formative conferences before the work on site .

The principal objective of these workshops, teaching aids of sensitising and formation, is to make possible to students to work, in an international context and in interdisciplinary way of doing within the framework of the conservation and the rehabilitation of the old heritage in seismic- prone areas, while constituting also a contribution to the continued local reflections.

The program was balanced, through work on site in small framed groups, between informative or formative communications around the explanations of the causes, the taking into account and the comprehension of the symptoms of the effects of the seismic risks as well as the methods and the examples of restorations, rehabilitations and mitigations...always from the point of view of the rehabilitation under the angle of sustainable development and the adaptation and the improvement of the local resources and techniques.

Each group was working according to an original method suitable to develop several aspects of the same building unit. The ones analysed the “skin”, the others the form, the others

the constructive techniques, the others the historical analysis and finally, the last ones the environmental datas.

The objectives of each group were to study an object, environmental, urban, architectural, technical...to analyse it and to propose an action, a mitigation, a rehabilitation, an installation of technical addings, an improvement in order to preserve the cultural heritage and in the same time to inlight the students and the inhabitants.

Thus were held nine seminars-workshops: the nine villages analysed since 1994 were Figuerola d’Orcau (Spain – 1994), Archanes (Greece – 1995), Peyresq (France – 1996), Santo Stefano di Sessanio (Italy – 1997), Jerica (Spain – 1998), Nissyros (Greece – 1999), Colmars les Alpes (France - 2000), Nicosia (Italy – 2001) and Castielabib (Spain – 2002).

The case study of Colmars les Alpes

As an example, let us examine the case of the workshop hold at Colmars les Alpes in 2000.

For its 7th seminar-workshop, PACT 19 undertook, from the 10th to the 16th of July 2000, the study of the small village of Colmars les Alpes (Alpes de Haute Provence, France).

In addition to the European specialists who moved on the site and members of local associations , the one of the “Pays de Peiresc” and the other one of the “ Pays des 3”V” (Verdon, Var, Vaïre)”, implied themselves with enthusiasm in the project, showing a keen interest for the step.

Colmars les Alpes joined together all the desired characteristics. An old important history an a built inheritance of quality, still very well preserved in particular the ramparts on all the perimeter of the village.

Section II: Vulnerabilities within the settings of monuments and sites:
understanding the threats and defining appropriate responses

Section II : Identifier la vulnérabilité du cadre des monuments et des sites – Menaces et outils de prévention

Regarding the seismic prone-area characteristics, Colmars les Alpes is classified in Ib zone in the seismic zoning of France, and also presents, according to the PPR (Risks Protections Map), a whole serie of major natural risks (floods, movements of ground, snow floods and forests fires).

The history of Colmars begins during the 11th century before J.C. with the arrival of the Gallites on the site. It continues until today with important facts such as the development of the cloth and the woollen manufacturing during the 15th century; the arrival of the king of France François the 1st at Colmars during the 16th century who decided the important reinforcement of the systems of fortifications of this border town between France and Savoy; the king Louis the 14th entrusted the revision of the fortifications designed by Vauban and his lieutenants Creuzet de Richerand and Niquet, they particularly raised the forts of France and Savoy as military keys in that narrow valley of the Verdon river; Napoleon Bonaparte resided also there to prepare the wars of Italy during the beginning of the 19th century.

It is important to notice that as a military “ place-fort”, Colmars was very crowded, essentially by soldiers, until the middle of the 19th century that explains the high level buildings (sometimes four levels high).

The work on site.

If the risk is a combination of the hazards and of the vulnerability.

$$R < H * V$$

If it is important to know as much as possible about the possible hazards, for the case of the earthquakes, it is impossible to reduce or to eliminate them. So, to reduce the risk, we have to work on the vulnerability .

The work on site has thus to be focused on the knowledge of the hazards, of the ground as a transmitter; on the deep study of the buildings and the arrangements of opened spaces.

The work on site of the actors of this PACT 19 summer seminar-workshop moved towards the interdisciplinary analysis of the site in its globality, analysis followed by proposals of mitigations and rehabilitations based not only on the characteristics of the site in the broad sense but also on the public interests described by the local communities

and the inhabitants themselves during the conferences and debates.

These seminars-workshops want to be a teaching aid of awareness and formation for the students involved (more or less 30 coming from 5 different countries) but also, together with this educating process, a contribution to the continued local thoughts.

Objectives and methodology.

The principal objective of these workshops is to make possible to students to work together with the teachers and the specialists in an international context and within interdisciplinary exchanges under the framework of the conservation and the rehabilitation of the old frame in seismic prone-areas.

This type of experiments has to be developed into the university lessons to meet the urgent needs for taking into account the particularities of the heritage faced to such risks and the peculiar way of thinking for acting in such field completely different of the way to construct for new buildings for instance.

For sure, the “stake” of such a work lies in the diversities of approaches which are professional, cultural, economical,...

At Colmars, the objective of the work for each group was to study an “object” environmental, architectural, urban, technical,... to analyse it and to propose an action, a mitigation, a rehabilitation, a technical installation, an evolution,... in order to preserve and to improve the cultural heritage.

Each group worked according to an original method suitable to develop several aspects of the same built unit.

The practical part of the workshops had the aim of making a work on site which allows the collection of data and real analyses on the basis of informative and formative conferences which help to formulate the question of the future of the heritage within all its architectural, technical, cultural, social, becoming. All of this to be specially efficient, from the educational point of view, had to be developed and finished in one very hard worked week.

At the end of this week, drafts of solutions and ways of thoughts for the rehabilitation and the mitigations must be elaborated by the groups to be used as supports for the public exhibition presented to the mayor and the town

Section II: Vulnerabilities within the settings of monuments and sites:

understanding the threats and defining appropriate responses

Section II : Identifier la vulnérabilité du cadre des monuments et des sites – Menaces et outils de prévention

representants, and visited by the local inhabitants. It is also important to nourish the proposals which will be elaborated after the workshop by each member of the groups during the following year for some thesis for example.

After three preliminary preparation campaigns, the organisation team suggested the following themes for the work on site:

1. the vulnerability and the natural risks
2. the study of the “skins” (facades, surfaces,...) as markers of the history and of the seismic history as well as for the constructions as for the natural and built landscape.
3. the study of an important monument, the Saint Martin church through its morphochronology as also elements of local seismic history
4. the study and proposal of re-use for a monumental unit (the fort of France)
5. the study of two small houses with degraded structures. Houses of completely different typologies and soils (the house Barbaroux, of very regular shape, situated between two other similar houses, built on soft soil and the Guyon house of irregular shape, isolated for tree facades and built on the bedrock).

Each group was coached permanently by teachers coming from different specialities and countries. Nationalities and domains of studies of the students were voluntarily mixed in each group in order to cause confrontation and dialogue between cultures and different “angles of sight”.

The first purpose of the seminars-workshops remains obviously in the awakening of the need for a real interdisciplinary work on this kind of problematic questions.

It is certainly not a multidisciplinary work divided into different layers of successive, tight and independent approaches.

The goal, the suggested methodology, the tracks of thoughts, the resources documents, the resources-people and the teaching intentions were clearly presented in the educational cards completed by the first documents, the preliminary statements and an illustrated report coming out of the preparation campaigns.

Considering that the objectives of the seminar-workshop had been voluntarily limited to remain into the field of reality, the results exceeded the hopes.

Elements not considered by the initial program were added such as the identification of the small vernacular

heritages as the doors, the windows, the shutters...and a study of the global overall vulnerability of blocks of buildings.

Lastly, at the end of the workshop, it appeared more interesting to amalgamate the results of the group “vulnerability” with those of the specific studies, in peculiar the results of the group in charge of the specific studies on the housing buildings (the two houses).

Results.

Which were finally the results of this working week for the five groups?

1 the vulnerability and the natural risks

A chart of sandstone’s, alluvia, sedimentary deposits and rock exposures were put into adequacy with the locations and the typologies of cracks and damages.

The easily flooded zones imply an immediate vulnerability for the buildings which are settled there.

As already written, the vulnerability of the buildings was finally gathered with the studies of the various buildings of the village (together with the joint houses, the Saint Martin church, the fort of France, the Guyon and Barbaroux houses).

2 the study of the “skins” (facades, surfaces,...)

The characteristics of the “skins” (materials and damages of the facades) was drawn up. These characteristics were correlated with the damages to determine the vulnerabilities.

In parallel, a catalogue of the existing chromatic range (according to the NCS Natural Colour System) is settled down.

Proposals of rehabilitations of the “skins” were suggested as well as a harmonic chromatic pallet according to the combinations NCS.

Other types of doors, shutters,roofs, materials of frontages were put forward in order to increase the typological approach of the urban core.

3 the study of an important monument, the Saint Martin church (Fig.1)

From the historical texts (in particular, the description of the description account report of the construction of the last

Section II: Vulnerabilities within the settings of monuments and sites:
understanding the threats and defining appropriate responses

Section II : Identifier la vulnérabilité du cadre des monuments et des sites – Menaces et outils de prévention

church, written in old occitan language and “translated” into contemporary terms and put in relation with the architectural and structural observations of the building itself (based on deformations, pathological analyses,...), morphological and constructive evolutions were presented. It was then possible to draw up a mechanism of ruin under the effects of an earthquake (using possible spectrum of earthquake in the area). Proposals of appropriated techniques of mitigation (placement of ties, reinforcement of the chaining,...) and ways of rehabilitation were then proposed (the technical details were fully described and sometimes shown through sketches).(Fig.2)

4 the study and proposal of re-use for a monumental unit (the fort of France)(Fig.3)

The study of the historical monuments (particularly the texts and drawings of the collaborators of Vauban) and of the scars and marks on the building itself made possible to draw up a report of the morphological evolution of the fortress.

The structural analysis and the study of the ground enabled us to present a “ clinical” description and diagnosis of the building.

The functional needs and the condition of the construction and of the substrate foundations led the members of the group to propose a “ Cyberfort” (centre of cybernetic communications) as well as a centre of informations about the region, about the sustainable development, also a meeting centre for young people, built with very light techniques (essentially in wood frame) and completely reversible (according to the principles of the charter of Venice) . The constructive details were also drawn up. (Fig. 4)

5 the study of two small houses with degraded structures. (Fig.5)

Accurate descriptions of the buildings were drawn up in plans, sections, facades as well as the constructive details, the cracks, the deformations and displacements in order to include/understand the constructive systems and their evolutions through time.

The weak points of the construction were pointed out starting from the cartography of the damages (cracks, displacements,...). Seismic assumptions of origins and effects tried to explain these damages in the buildings considered in their contexts (arranged, isolated,...). Proposals of mitigation techniques (ties, chaining, specific details,...) were described not only to try to decrease the

vulnerability but also to encourage the effort for harmony of the built core into a sustainable and local development.

(Fig.6 ,Fig.7, Fig.8, Fig.9, Fig.10)

Conclusions (Fig.11)

In conclusion, it appeared completely obvious that the initial challenge to inform, make people sensitive to and to work on a real case study, with about thirty students coming from different countries and cultures was not so impossible as it appeared in a first approach.

From initial very varied educations which were spread out from a specific parseismic knowledge to zero knowledge; from the control of tools of computing and modelling (finite elements for buildings subjected to dynamic stresses, in peculiar seismic) to quite nothing in that field, from approaches of the restoration and of the rehabilitation which are distributed since the absolute “respect” and the strict use of old techniques to the boldest contemporary interventions and techniques; we have to notice that the “alloy” took in some days under the “pressure” of the work on site and the responsabilization of the students in front of a real demand of the local population.

If the new building or to build will be able to “ perhaps move” under possible seismic requests, **the old buildings or the set of old buildings on a seismic prone-area have moved!**

They are speaking laboratories. It is then possible to explain the risks and their consequences from the marks of their effects and then to correlate these consequences with the vulnerability of the buildings. That is inevitably very teaching and very immediate!

Section II: Vulnerabilities within the settings of monuments and sites:
understanding the threats and defining appropriate responses

Section II : Identifier la vulnérabilité du cadre des monuments et des sites – Menaces et outils de prévention

Abstract

Since 1991, specialists of safeguarding and rehabilitation of the building heritage and old sites under the natural risks, and more precisely at the seismic risks, met in a network, component of group PACT of the European Federation of networks (F.E.R.) placed under the aegis of the Council of Europe. This component PACT 19 (A), gathers geophysicists, geologists, engineers of structure, engineers of the building and the architects... all professors of universities, schools of architecture or researchers who come from Belgium, of Spain, of France, of Greece and Italy. Among the activities of the network (course, researches, expertises...), seminars - workshops of summer of sensitising in Europe brought together, since 1994, students and professors around 9 cases of studies vernacular villages with some important monuments also, nine seminars - workshops which organised work in formative conferences followed by a work of ground under the angle of the taking into account of the risks, of the evaluation of the degrees of vulnerability, the urban and architectural mitigations... always from the point of view of the restoration and the rehabilitation under the angle of the durable development ,the adaptation and the improvement of local resources and techniques.

Section II: Vulnerabilities within the settings of monuments and sites:
understanding the threats and defining appropriate responses

Section II : Identifier la vulnérabilité du cadre des monuments et des sites – Menaces et outils de prévention

INTERDISCIPLINARY PARASEISMIC CONCEPTION AND REHABILITATION OF THE CULTURAL HERITAGE IN SMALL VILLAGES. WORKSHOPS WITH STUDENTS ON SITE.

Wilquin Hugues / Belgium

Engineer Architect, Polytechnical University of Mons
Professor, Ecole Centrale of Life



Fig. 1 External view of the Saint Martin church and damages on the vaults

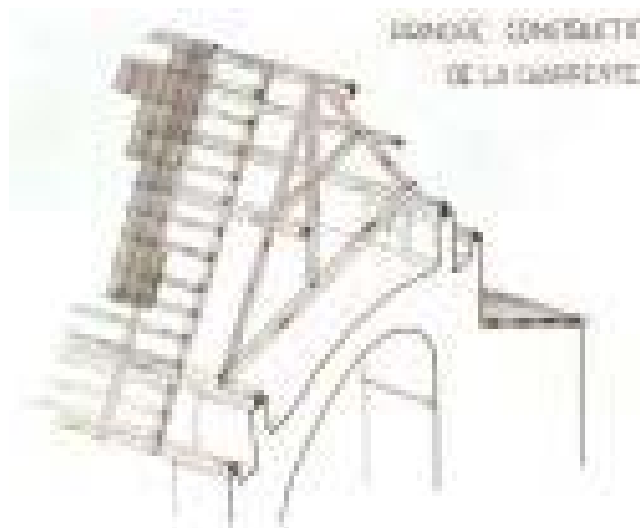


Fig.2 constructive system of the carpentry

Section II: Vulnerabilities within the settings of monuments and sites:
understanding the threats and defining appropriate responses

Section II : Identifier la vulnérabilité du cadre des monuments et des sites – Menaces et outils de prévention



Fig.3 the fort of France

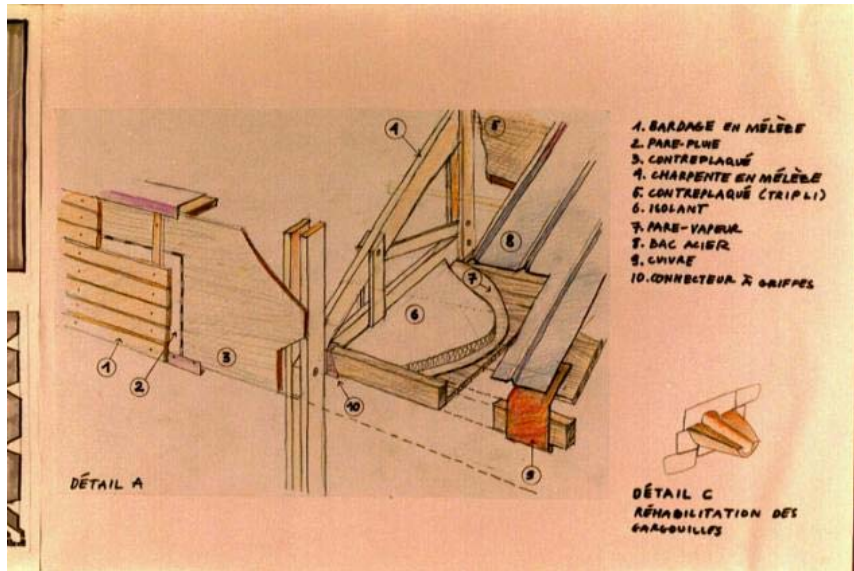


Fig. 4 Details of rehabilitation

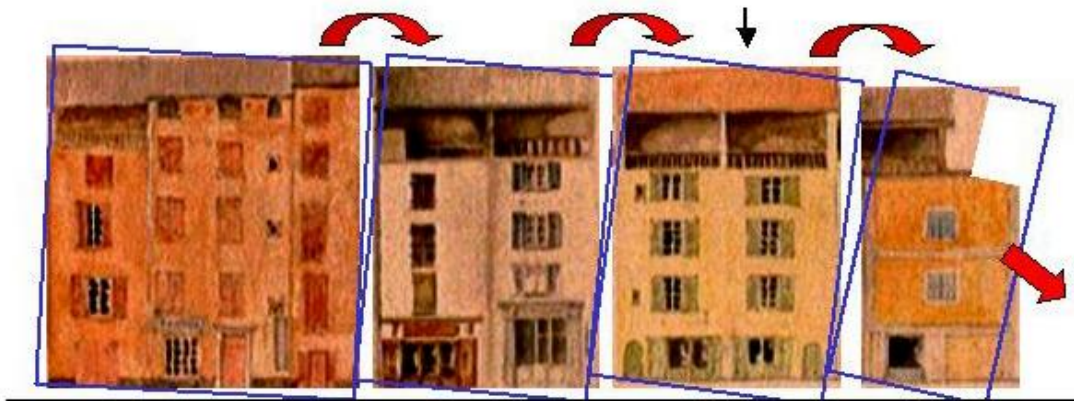


Fig.5: the Barbaroux house in the street

Section II: Vulnerabilities within the settings of monuments and sites:
 understanding the threats and defining appropriate responses

Section II : Identifier la vulnérabilité du cadre des monuments et des sites – Menaces et outils de prévention



Fig.6: the Guyon house

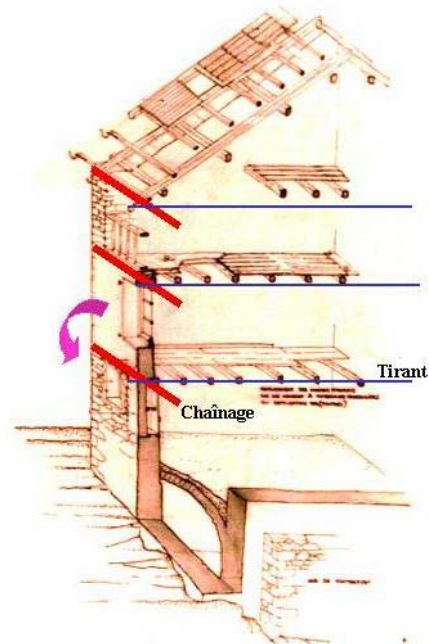


Fig.7: proposals of reinforcements

Mécanisme de rupture-collaps possible: Maison BARBAROUX

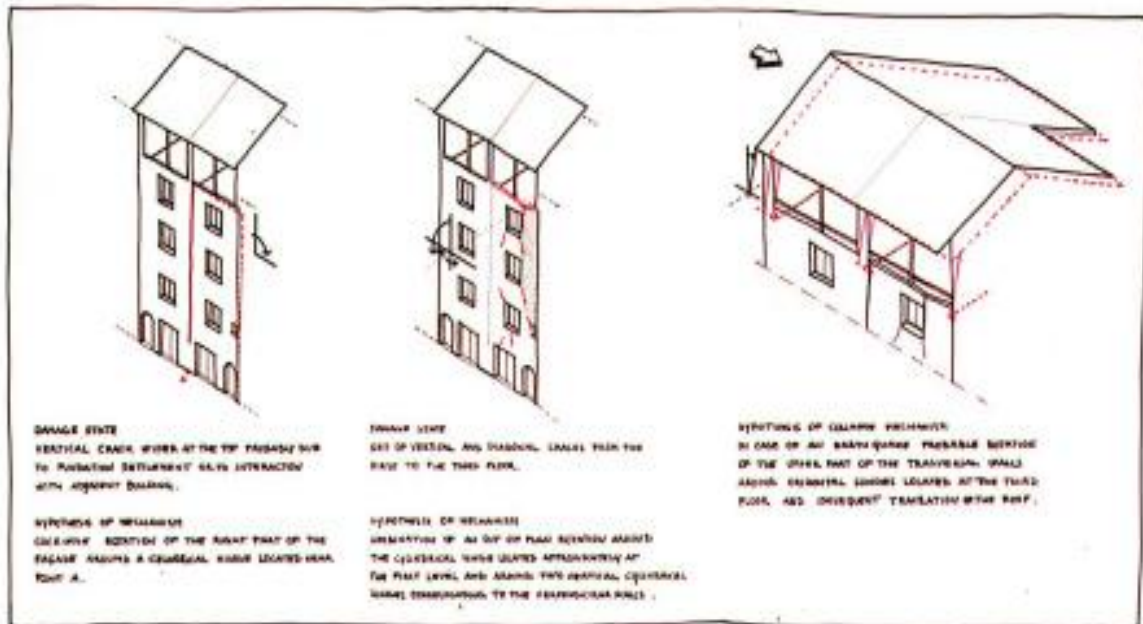
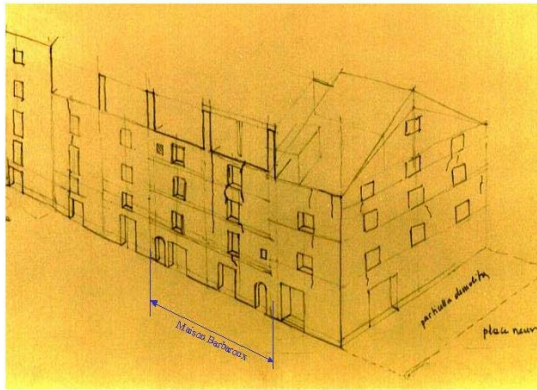


Fig.8: Barbaroux house possible collapse mechanism

Section II: Vulnerabilities within the settings of monuments and sites:
understanding the threats and defining appropriate responses

Section II : Identifier la vulnérabilité du cadre des monuments et des sites – Menaces et outils de prévention



Grande Rue : mise en évidence de la parcelle démolie

Fig.9: showing the impact of the destroyed houses during the 19th century

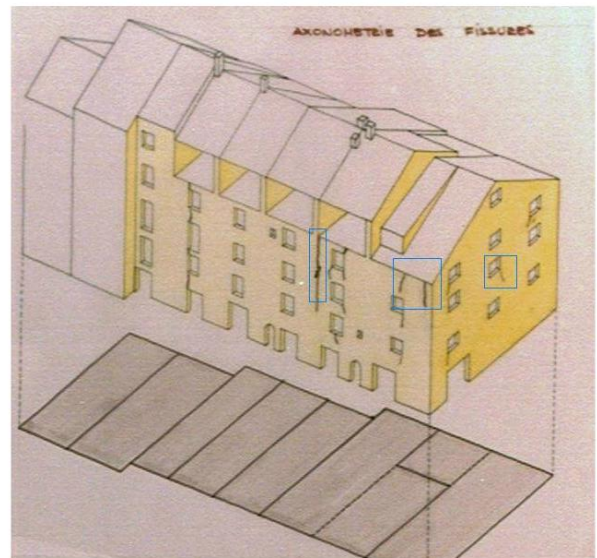


Fig.10: axonometric view showing the cracks



Fig.11 students presenting their works