

## M.I.C.R.A.

# ***A WBI System To Manage Information For The Recovery Of Ancient Buildings***

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*In the field of Architecture and Building Construction is increasing the tendency to search information in the old construction handbooks to find more easily the best solutions to the recovery of ancient buildings: to make them easily accessible we are developing an “electronic handbook” by using the technologies related to Internet.*

*The paper reports on M.I.C.R.A. (Manuale Informatizzato per la Codifica della Regola d’Arte), a WBI System able to allow different kind of users (from experts in the fields of Architecture and Building Construction to university students) to easily find the information stored in the old construction handbooks -edited since the 18<sup>th</sup> century and normally stored in different libraries around Europe- and to immediately compare them each other.*

*The system information management and the data structuring are explained by describing the design strategies and the specific “research criteria” we have adopted to the development of the system.*

***Keywords:*** *Web Knowledge repository; Didactic strategies; Information accessibility; Information management; Data structuring.*

### **Introduction**

The rules that anciently were at the base of the building construction can be useful to help architects or building engineers involved in the recovery of ancient buildings.

Actually, they can allow to establish how the formal and material constitution of the building elements could have been in origin; moreover they can allow to estimate the transformation that the constructive element had to sustain during their life. So, it’s easy to understand how these rules can contribute to the definition of projects aimed to the recovery of the ancient buildings and, in particular, to the recovery of the building elements showing, at the same time, a big regard for their original formal and constructive characteristics.

These rules can be heard by analyzing the existing building elements and by studying their description reported in the old construction handbooks edited from

the 18 century: in these handbooks, for the first time, the building experience of the past have been systematically codified.

### **Information domain: analysis and evaluation**

To project the M.I.C.R.A. system we have consulted the old construction handbooks stored in the D.P.C.E. library and the handbooks stored in some other libraries of Palermo. In these handbooks the different authors present, in a simple way, dimensioning and execution criteria, rating methods, quality indices, and so on. These information are considered by the author useable in all the geographical contexts so, they assume a universal nature, actually they are not related to a particular age, because they represent a building age-long tradition; for this reason the information of the old construction handbooks can be

considered as a general rules that are valid in space and time. Generally the handbooks are organised in one or more volumes in which the textual information are collected, and in plates where, through a wide range of drawings, the textual information are visually explained. These plates providing deepened details on the different building solutions explained in the text. Only in some cases the drawings are directly integrated with the text.

The volumes and the plates are organised by subject: this organization allow users to read the old construction handbooks also by single chapters.

In the handbooks of the 18 century[1] the textual information related to the building construction elements are reported like a “story” about the experience of the masters mason so, because of the prolixity of style, they frequently became useless. In the text is possible to found the description about the realization methods but in many cases this description are too longer because the author dwell upon a subject reading about the different realization stages: from the finding of the building materials until to some practical suggestions useful to the building maintenance.

In the old construction handbooks the information structure suffered some changes during the ages actually, after the industrial revolution, they become more synthetic[2].

The textual information are less then the drawings that are aimed to explain particular problems about the building construction and the performances of the different constructive elements. From the analysis of the old construction handbooks has emerged the existence of formal and constructive criterions that constitute a set of general rules universally accepted and usable in different contexts.

With the aim to control the validity of information that is possible to extract from the old construction handbooks and that it is possible to use for the recovery of the building elements of the traditional architecture, we are verified the possible correspondences between the building peculiarities found in the real cases and the formalities of realization

described by the different authors of the handbooks.

To make this comparison we have defined an experimental methodology of investigation. This methodology was applied to some building elements adopted in the ancient buildings of the Western area of the Sicily and, in particular, to the not stone horizontal roofing: the discontinuous roofing. The comparison has been conducted on 70 buildings sorted out between the more widespread building typologies in the Trapani’s surrounding (wine factories and agricultural beams, noble and more common buildings). These typologies are meaningful for dimension and conformation. In particular we have identified 11 typologies of roofing with two different estate layers made with pantiles (Fig. 1) or French gutter tiles (Fig. 2). The presence of the two different kinds of layers is due to the presence of other types of layers.

The comparison has underlined how the building peculiarities of the traditional architecture of western Sicily confirms, in the greater part of the cases, the validity of the rules that is possible to extract from the old construction handbooks. In spite of everything some meaningful differences has been underlined in relationship to the materials and the geometric characteristics of the building elements (fig 1 & 2).

## **The system M.I.C.R.A: data structuring and information management**

The difficulty derived from the large quantity of information that is possible to extract from the old construction handbooks, the different way to face matters by the authors of the handbooks and the impossibility to easily manage this information have led to the definition of a new kind of handbook by using the New Information Technologies.

Actually, the old construction handbooks are stored in different libraries around Europe and for this reason they are not easily accessible by the users interested in having information about the old buildings construction. Furthermore they are not in commerce anymore and because of their state of preservation

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they can't be consulted by a wide range of people.

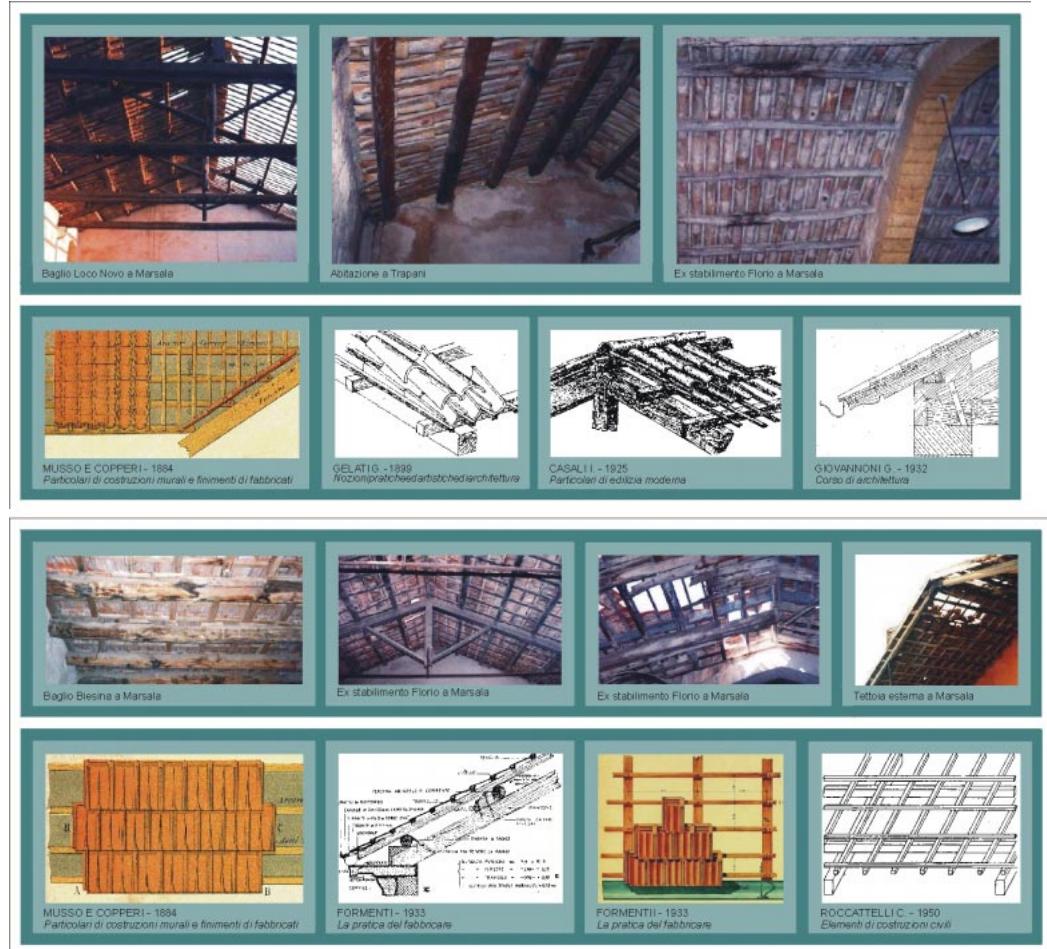
In the old construction handbooks the information is organized by subject. Texts and images are stored in different part of the handbooks preventing users from making a clear view of the building technologies (Guenzi, 1981).

With the aim to overcome the limits above mentioned and to create an effective tool to support the activities of technical operators in the recovery of

the ancient buildings, we have designed a WBI system able to allow different kind of users (from experts in the fields of Architecture and Building Construction to university students) to have easily and immediately access to an "electronic repository" of constructive rules brought by the different authors of the old construction handbooks.

This "electronic repository" allows to go beyond the principles established for paper textbooks, which

*Figure 1. Roofing with pantiles. In the case of roofing with pantiles, fillets and purlin some differences are due to the climate of Sicily (rather mild); these conditions influence the slope of the pitches. The elements of the estate layer have also slightly superior dimensions in comparison to those foreseen in the old handbooks, probably because they don't have to bear the load of the snow. Other difference consists of the use of fillets of circular form instead of not quadrated chestnut joists, more easily available in the specific geographical context.*



*Figure 2. Roofing with French gutter tiles. In the case of roofing with French gutter tiles, nailing strip, batten, and purlin there are not differences because of the dimension of the French gutter tiles. Actually, their standard dimensions force to adopt the same elements and/or layers with standard dimensions*

are organised by subjects. Actually, the information stored in the old construction handbooks has been organized in the system M.I.C.R.A.-Manuale Informatizzato per la Codifica della Regola d'Arte[3] considering buildings as a technological system made up of a set of "technical components" characterised by their own structural and spatial continuity. This criterion makes reference to the UNI 7865 4<sup>^</sup> standard that considers the "technological system" composed by three different categories: technological units classes, technological units and technical components classes (Fig. 3).

For a ready reference and an easy contextualization, the information has been systematised by subdividing each technical component (floor, ceiling, roof, curtain walls, etc.) into

functional elements and/or layers[4]. This approach enables the user to understand how every f. e. and/or l. are made up and built; it also allows to overcome the limits due to the information structure of the old construction handbooks.

Furthermore, this codification of data obtained by the division in f. e. and/or l., makes the information taken from different handbooks homogeneous and, consequently, easier to mutual compare. Users can obtain specific search results, by using the M.I.C.R.A. system, more or less rapidly, according to the amount of data input at the beginning of the query; actually, they can have access either to sets of descriptions showing the features of the f. e. and/or l. sought or to single descriptions simply by using the specific tools foreseen in the system and related to refined search

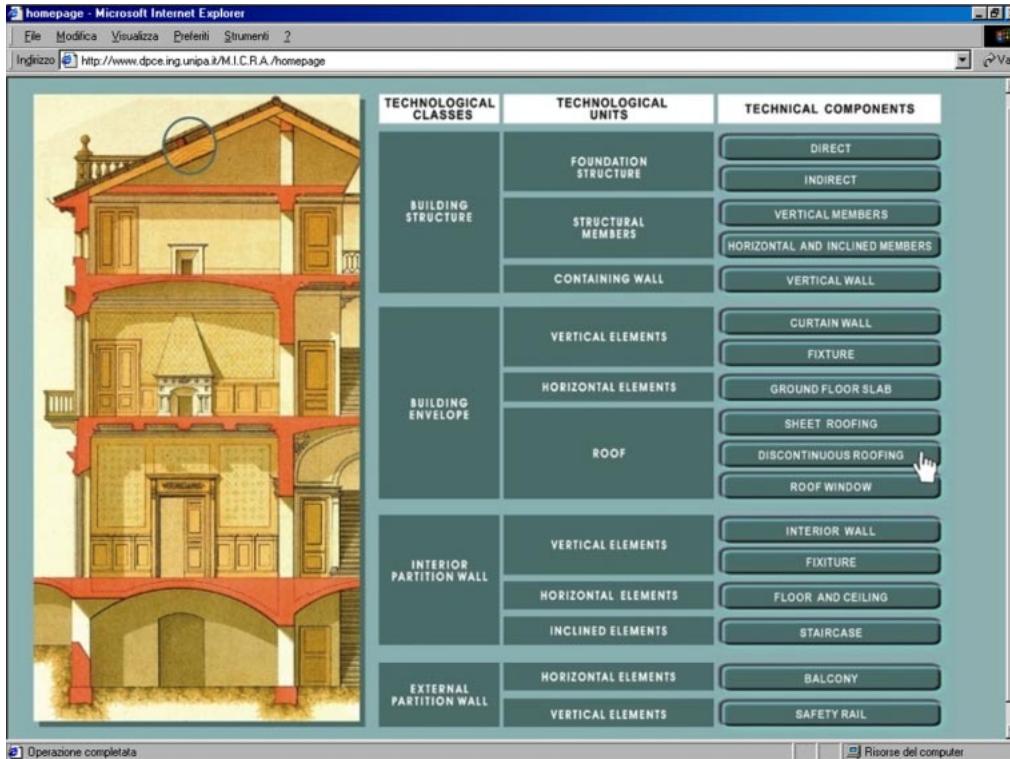


Figure 3. The system home page: the active buttons are related to the technical components of the ancient building. By clicking the buttons it is possible to enter the system pages. In each pages a drawing shows the f. e. and/or layers related to the information stored in the system

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criteria. Such potentiality of the system offers a wide range of information useful to the technical operators for the control of the intervention on the existing building heritage.

The user can program his research through the use of a query boxes foreseen on the left side of the system pages. These tools are always active during the navigation (Fig. 4). (Corrao, R., De Vecchi, A., Colajanni, S., 2001).

Depending on the amount of data input at the beginning of the query and according to their special needs, users can achieve specified goals with effectiveness, efficiency and satisfaction simply by using the system tools. Moreover it is possible to activate a researching for images that are organised in a

specific section of the system. Through the button “Images” not much expert users can have more easily access to the textual information stored in the system: actually the images represent, in particular for students, a simple way to understand the problem related to technical elements (fig 3 & 4).

## Conclusions

The constitution of a knowledge repository as described is able to help technical operators to define compatible solutions with the modalities of execution and the original characteristics of the ancient elements. Moreover different users can easily study the peculiarity of the technical elements typical of the ancient buildings.

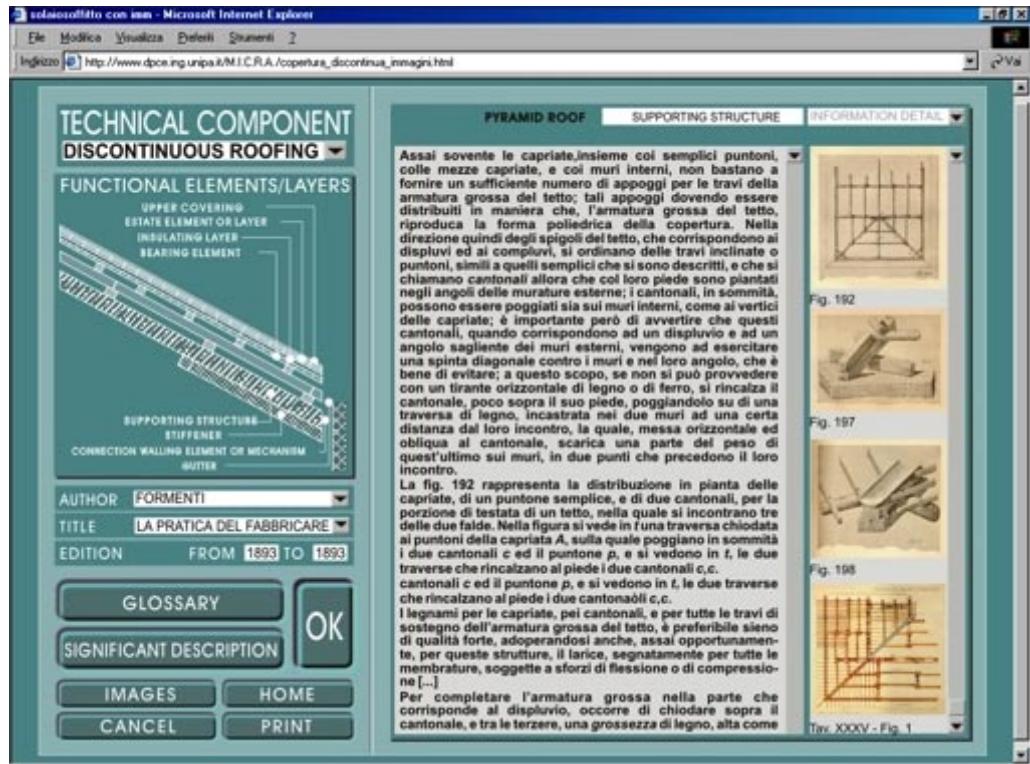


Figure 4. One of the system page: on the left side of the system you can find the query boxes to program the research activity. Text and images are shown on the right side of the page, according to the research criteria specified by the user at the beginning of the research activity

The use of the system can help users to realise recovery project, actually this system allows to reset the fragmentary universe of the information stored in the old handbook and compare them to each other to understand the technological characteristics of the constructive elements of the past. In these way the users can be fully aware of having done recovery projects respecting the original characteristics of the constructive elements of the past.

## Footnotes

- [1] Following you can find some of the construction handbooks edited in the 18 century that we have consulted to define the information structure of the system.  
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- [3] Electronic Handbook to codify the “workmanlike”.
- [4] From now on you will read f. e. and/or l. instead of functional elements and/or layers.

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