

# Consistence, quality and seismic vulnerability of built environment: an appeal for information

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## 6. Consistence, Quality and Seismic Vulnerability of Built Environment: an Appeal for Information

The Istituto di Costruzioni Edili of the Faculty of Engineering, Naples University, Italy, was set up in 1967 combining the Chair of Drawing with that of Building (Costruzioni Edili) to which is attached the Study Centre for Systematic Design.

The research theme common to both sections is that of knowledge of the building heritage of Campania and its neighbouring regions: this is carried out by the Drawing group as regards formal-architectural aspects and by the Building group as regards technical questions. The Centre concentrates on the methodological problems arising from our research or those of interest to other Naples University Institutes with whom it is connected.

In particular the Institute proposes over the next three years to define – on the basis of experience accumulated over many years – an easily applicable technique which will enable both national and local technical organisations to carry out a census of the consistency, quality and vulnerability of the building heritage of Campania and neighbouring regions.

Until this time, all the descriptions of existent buildings and of their environment have been made as a set of observations of random data completed, when possible, with photographs and/or drawings.

The Institute has at its disposal a collection of survey cards prepared according to traditional criteria. Amongst them are the cards used after the Friuli earthquake and those worked out by various Naples Engineering Faculty research workers. These last were used for our investigations on the Irpino-Lucano earthquake.

On the basis of this experience we have come to the conclusion that research on rational knowledge of human settlements must be articulated as follows:

- (1) standardization of survey techniques
- (2) elaboration of cards to be filled in by medium-skilled people to collect and to present all the useful data in a form suitable for further investigation
- (3) "translation" of the "verbal" and "graphical" information in a single language. This means a scientific investigation of the structure of both sets of information. An analogous "mutual translation" must be performed for the two approaches to building science: technical and architectural
- (4) elaboration of a technique for the computer analysis of the cards and of the survey drawings, their classification and their filing in a data bank
- (5) analysis of the data bank from aspects useful for scientific and planning purposes
- (6) experimentation of a technique for the use of the data bank for actual design purposes.

The contribution so far made by the Istituto di Costruzioni Edili to this programme is as follows:

- a rapid survey of buildings and of the crack picture: we have created an interactive graph programme for perspective "restitution" from photographs, plans and even internal prospects of buildings and for the spatial vision of the crack picture
- b. analysis of the "verbal" reports (i.e. of the descriptions in everyday language of observations which cannot be represented graphically);
- c study of traditional constructional and technological systems with which buildings have been constructed and which have the same or analogous building functions in different environments (a study which leads to the identification of classes of homogeneous constructional types)
- d elaboration of mechanical models corresponding to the constructional schemes examined
- e elaboration of topological models
- f classification of the single cases in classes defined by single topological models.

We therefore propose a system of models at varying degrees of geometrical abstraction (from architectural drawings to mechanical models and from these to topological models); the system allows a typological classification of buildings by means of which we can define, on the basis of the knowledge of the local building techniques, the boundaries of the great cultural areas which we call "isotechna". These will be obtained from a systematic analysis of buildings chosen in various geographical areas characterized by specific constructional traditions and by particular environmental situations (deterioration, seismicity, hurricanes, etc.).

In addition if we compare mechanical and abstract models of other building types, even if realised in other cultural areas, with those of the buildings in the Mediterranean area studied by us, we can see how very different forms (which come however into the same topological class) can have equal advantages with regard to risk from earthquake.

We therefore address this appeal to members of IABSE who are interested in these problems, inviting them:

- i to integrate reciprocally the collection of cards of a traditional type already tested in practice
- ii to examine the validity of the line of research summarily described here and, if it is thought worthy of correction and integration, to let us have any suggestions they wish to make. For the purpose my Institute will send to those who request them notes and drafts produced by us on the points of our programme already carried out or in process.

*(Prof. Guido Guerra)*