

## **QUICK SURVEY SYSTEM**

C. Campanella <sup>a</sup>, M. Bondani <sup>b</sup>, G. P. Toscani <sup>c</sup>

<sup>a</sup> Studio Associato Campanella Tessonni, Via Marazzi 11, 26013 Crema, CR, ITALY - [mtessonni@tin.it](mailto:mtessonni@tin.it)

<sup>b</sup> Borgo Antini 7, 43100 Parma, PR, ITALY - [marcobondani@puntostudio.net](mailto:marcobondani@puntostudio.net)

<sup>c</sup> Via Boito 15, 43011 Busseto, PR, ITALY - [archiepo@libero.it](mailto:archiepo@libero.it)

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### **ABSTRACT**

The quick survey method starts with an initial phase by mean of paper cards and ends up with a final data processing by mean of a software developed on purpose. The term “quick” describes the survey technique that enables to record the existing situation of the object under study. Information collected through these file cards concern the structure and the material of the building with relative measures that together with other data enable to quantify with good exactness the intervention cost. The form lay out consists of four sections, independent and complementary between each other.

**SECTION A – Building unit:** general data. The analysis of the built-up parts can be related to the single building unit, to the whole unities forming a block or to a complete historic centre. Actual norms do not foresee guidelines for the survey phase so that collected information and their management often undergo important imprecision and insufficiencies. **SECTION B - Building unit:** morphology. This section faces the subject of elements external to buildings. As a matter of fact minor buildings pose concept and technical difficulties diversified in respect to single monuments; they present a higher typicality and consequently minor freedom. The reclamation of urban centres can not have recourse in investigations made case by case: proportioned techniques of decay analysis are needed. **SECTION C – Living unit:** description. The system works on all interior details. Building techniques as well as construction systems for vaults, floors, roofs and stairs are often unknown and one can not generalize. **SECTION D – Installations** supplied to each room. In this phase the system directly analyzes all equipment supplied to single living units in order to check their reversibility or the possibility to substitute them with new equipments.

### **1. INTRODUCTION**

First essential operation to perform while setting up the intervention plan of any architectural construction, is the wellorganized preparation of a survey knowledge plan. The exact identification of those mechanisms that cause modification and decline of the building materials, its recognition as well as an analysis of the general characteristics of the construction, of its “health” in relation to structural and environmental factors will certainly lead to a plotting as much accurate as possible to the physical-pathological reality of the studied object. This operation is able to identify, quantify and represent all those constructions showing degradation and aggression by pathogens and at a second stage is able to give suitable and accurate solutions for all those problems linked to their bad preservation state. Collected qualitative and quantitative data will match the right operative phase, clearly bearing the intervention philosophy that through a global executive project aims to give back to the building its former use (also partial). Therefore the “restoration” of a building cannot be limited to cleaning, protection and consolidation operations and only be restricted to the maintenance of the materials condition, on the opposite it must go further and grant the “monument” a new life through its use. In the majority of cases the intervention on a construction can not be considered over until the building is re-used. It will be a compatible re-use able to face technical norms sometimes too strict in relation to security, practicability, environmental comfort, hygiene as well as to the protection of the building object of the intervention. Once again its survey and global knowledge turn out to be a vital base to prepare all projects for its use.

### **2. CARD-INDEX SURVEY**

#### **2.1 Foreword**

Whether until some years ago the drawing was the memory

scene “par excellence”, the unique useful mean for the geometric plotting of an existing situation, today technique and technology have such developed to allow the use of advanced instruments to support knowledge. These are information technologies, able to handle and process big quantities of data obtaining results through an in-depth study defined a priori. They are complementary study routes like: drawing acquaintance by mean of vector elaborations of geometric elements and metric image elaborations for material surveys; knowledge of the intrinsic characteristics of a construction through the filing of those elements that define the materials conservation state. Both are result of the survey phases, carried out in classic form for what concerns geometric elaborations and/or by card-indexing for the stage of in-depth study of the characteristic elements. If geometrical survey consists in measuring empty parts for drawing full ones, the computer card indexing will underline all those characteristics noticed during a visual survey and supported by schemes that enable its reporting. So, the need to have a quick survey system organized through index-cards able to collect as much information as possible directly on the field gave birth to a new analytic working support; it was created using the power of the machine of incoming data which could be easily updated and modified (also later on) by mean of a software created on purpose. The support in reference consisting in index-cards, enables to collect objective information that help the operator to understand the building also in case of surveys made by portions and by different operators. Information collected by cards are related to the building materials and structure at the moment of the survey and report relative metric values. In addition to these, other information regarding its environment, its final destination, presence and functioning of equipments are collected in order to evaluate their improvement/implementation and/or eventual re-use. All collected data can be transferred on software support. The cross reading of acquired information enables the survey performer to understand those intrinsic and extrinsic causes that have led to degradation in order to report or set up deeper researches aimed to their identification and

subsequent elimination.

Obtained data are a powerful instrument to estimate the necessary intervention entity from a quality as well as from a quantity point of view and at a second stage it enables the operator to precisely define the expenses economic account. The results of the inspection phase can be reported in an extensive or detailed form to satisfy intervention planning needs also in those situations where deep and systematic inspections of the estate can not be performed as for example in an historic centre. Another use of these information can be the monitoring of the conservation state of a whole urban complex or districts where no preservation intervention is foreseen in short, but where degradation makes monitoring of building characteristics and pathogens necessary.

Collected data will therefore be an important reference to understand degradation progress and its eventual acceleration becoming the instrument to evaluate the priority of interventions.

## 2.2 Card-Indexing

### 2.2.1 General norms for the correct use of card-index plot:

Card-index plotting is made of four sections so split:

- Section A: Building unit - General data
- Section B: Building unit – Morphology
- Section C: Living unit – Description
- Section D: Installations supplied to each room.

Aim of this division was to obtain a quick instrument for the analysis of any situation under study. For this reason above four sections result to be independent and complementary at the same time. Here after on you will find the detailed description of each single card and clarifications on how to edit and fill them in. Proposed cards are of course generic and isolated from a specific context. They can be changed, modified and expanded by each operator according to the purpose you want to achieve. Their set-up has to be absolutely tuned on the collection of information and on an eventual elaboration of final data. Sections are independent since according to the need, a unique section can be analyzed so avoiding that collected data may be insufficient to obtain information by processing them in a data base. They are complementary because starting from first section, it is possible to collect information subsequently linked to each other, starting from urban scale up to the building unit.

**2.2.2 Quick survey paper cards:** Cards have been set-up on the basis of acquired experiences in the field of survey both on urban scale and on the single building. In the attempt to present a complete and unique paper card sample, we have developed a series of definitions to describe the various situations that can be found in the analysis of a construction. Of course we are aware of not having described and summed up all those situations that may be present in the variety of the constructed estate. In any case this instrument has to be considered as such: a support, a schema to follow. It comes out the necessity to outline a concept, a trace to follow and to integrate with all those information necessary to underline the uniqueness of the studied object. We wanted to create a methodical route for organizing the acquaintance of the constructions to preserve. These survey operations enable the collection of information about the building conditions useful to create a form model for its visual analysis. Therefore cardindexing has not to be considered as substitute or alternative to the material survey, but compensatory and as a preliminary stage to evaluate the building qualitative and quantitative characteristics, targeted to the elaboration of the preservation project. The determination of the form model to be used for above described purposes has

certainly not been simple just because we wanted to avoid cards that may limit the survey of the conservation state to a superficial and short judgment. We refer to the well known and criticized adjectives “good”, “very good”, “ordinary” etc. that lead to a short judgment neither useful for a quick and final estimation. Such classifications, besides not suggesting operative solutions, reflect the subjectivity and sensitivity of the surveyor, resulting hardly comparable. As they are planned, they follow the same schema of a software, expressly developed for data processing.

**2.2.3 Section A: Building unit – General data:** Goal of the quick survey system is easiness of use being an application instrument that analyzes existing buildings and effectively contributes to the present organization of interventions.

The figure shows a paper form titled "A Caratteristiche urbanistiche generali" with a page number "1" in the top right corner. The form is divided into several sections:

- UNITÀ EDILIZIA N°:** \_\_\_\_\_ **Data del rilievo:** \_\_\_\_\_ **Filare:** \_\_\_\_\_
- A.1 COORDINATE GENERALI**
  - A.1.1 DATI ANAGRAFICI:**
    - IND. P.:
    - IND. C.:
    - IND. P.:
    - IND. P.:
    - IND. P.:
    - IND. P.:
    - IND. P.:
    - IND. P.:
    - IND. P.:
    - IND. P.:
- A.1.2 DATI CATASTALI:**
  - REDAZIONE:
  - CONLINE CATASTRALE:
  - FOLIO:
  - MUTUALE:
- A.1.3 GEOREFERENZIAZIONE:**
  - Sistema di riferimento: (Scegli il Sistema Nazionale)
  - Latitudine:
  - Longitudine:
  - Identificatore cartografico n.:
  - Identificatore fotografico n.:
- A.2 GENERE**
  - A.2.1 TIPO DI IMMOBILE** (Scegli)
    - Casa unifamiliare
    - Casa bifamiliare
    - Casa condominiale (uno o 2 alloggi)
    - Casa condominiale (più di 2 alloggi)
    - Villa
    - Casello
    - Comitato
    - Chiesa
    - Edificio specializzato
  - A.2.2 CONDIZIONI AL CANTONTO** (Scegli)
    - Edificio isolato
    - Edificio accorpato su un lato
    - Edificio accorpato su due lati
    - Edificio a linea
    - Edificio a schiera
  - A.2.3 TIPO A SCHIERA** (Scegli)
    - A schiera con linee di gronda alternate
    - A schiera con linee di gronda non alternate
    - A schiera con linee di gronda alternate
    - A schiera con linee di gronda non alternate

Figure 1. Paper forms title page relative to the section: general town planning characteristics of building unit.

The professional has often to face diverse realities of the built-up that may also regard the planning on urban and territorial scale. The analysis can therefore be related both to the single and to the whole of building units forming a block, an historic centre or in general a residential complex. Issues regarding the approach to the built-up can be identified by a series of deficiencies like: a) lack of a correct specific set of rules that really protects the existing object as a common resource; b) lack of a guideline concerning the first survey stage (both graphic and related to data about consistency, final destination, existing infrastructural net) and lack of a guideline finalized to permanency and to a compatible re-use namely to an active preservation of the built-up. Present practice and set of rules concerning knowledge and interventions on the existing, do not foresee a standard and precise procedure therefore information collection and handling still undergo important insufficiencies

and inexactness. Even though the common terminology undergoes misinterpretations and possible manipulation, the interesting element in urban context remains the building unit (meant as a whole of more buildings) with its three-dimensional development and function independence, static and figurative. If we analyze a complex reclamation plan of any urban area, was it a building portion of a big town or a modest rural historic centre, common dominator coming out is the request for redevelopment. Operational management needs concrete responses from civil service, for what concerns procedures, timing, estimation of resources intended both as constructions and as calculation of allowable contributions. Presently the used method is such organized that also for a partial intervention on a building (for example plaster remaking) it is necessary to perform an appreciable collection and subsequent processing of data. This does not always seem necessary and in any case it is not important to achieve those quality aspects expected for a correct organization and works execution.

**2.2.4 Section B: Building unit: Morphology:** In this section we face the subject of building external elements, too often solved during the urban planning and programmatic phases by a simple colouring of facades, as extreme simplification of a wider problem regarding the built-up.

Figure 2. Paper forms title page relative to the section: morphology of the building unit.

Today the modalities for performing a correct intervention on the built-up still remain unclear. In addition to the before mentioned lack of a specific norm being able to lead technical choices, another factor which basically contributes to this lack of clearness is the way scientific-technological researches have faced the problem of preservation. Within the preservation of small constructions we have today reached correct intervention methods thanks to an improved technical maturity of operators and thanks to the introduction of behaviour regulations (international restoring Charts, NORMAL recommendations, etc). However at the same time, we face a disorderly and approximate system where the private acts like unique

administrator, only interested to satisfy his speculative purposes rather than the requests of the built-up preservation. The consciousness of this phenomenon supports the necessity that the intervention activity, both building and urban, are ruled by an organic system of norms, procedures and methodologies.

A first step theoretically consists in admitting that, keeping firm the historical fundamental principles of the architectural restoration, it is necessary to trace different routes in relation to the nature of the intervention object. As a matter of fact the intervention on a minor building usually poses technical and conceptual difficulties diversified with respect to the single and singular monument; it also present a higher typicality and a lower freedom (especially in relation to external finishing). In the “case by case” analysis of minor building, we meet therefore a first fundamental need: facing survey techniques of decay and intervention analysis proportioned between each other and referring to recognized methodologies. In conclusion it is necessary to set a broken bone between advanced research and its application; the latter phase implies not only the knowledge of means that industry and research place at disposal, but of their correct application as well. Nevertheless, although the reclamation of urban historical buildings badly needs the support of diagnostic and scientific research, it can not have recourse to single “case by case” surveys due to time and cost limitations. The quick survey system intends to lead the survey on two levels; the first one allows a general analysis by visual detection of the recognizable decay situations; the second one refers to in-depth analysis for difficult situations, optimizing in such a way the study phase.

**2.2.5 Section C: Living unit – Description:**

Figure 3. Paper forms title page relative to the section: description of the building unit.

The living unit is considered as a living cell depending on the modalities of physical, formal and structural splitting up of the

investigation object.

Interiors and in particular the analysis of single components can support the representation of a multidimensional reality, hardly determined within synthetic figurative terms like all complex systems are. The living unit may coincide with the building unit or may be part of it together with other ones: in both cases volumetric consistency is characterized by some factors like: 1) correspondence to the facility original functions or to the global restoration; 2) historical events about subsequent additions and building adaptations; 3) total restorations mainly occurred from the post war on, that preserve residual elements of historical cultural interest (facades, vestibules, decorative parts); 4) particularly interesting buildings not belonging to common ensembles due to their intrinsic morphological complexity resulting from singular and complex planning and building events.

In this section the quick survey system analyzes the detailed card-indexing of interiors in connection to exteriors' study. Building techniques, systems for the construction of vaults, floors, roofs, stairs and anything that characterizes historical buildings, are often unknown to contemporary designer engineers, to supervisor technicians and to building contractors who are devoted to a market that supports assembled components for repetitive and indefinite uses. Past building techniques, on their own, greatly differ within single geographic areas and often even within the same historic centre. For this reason it is not possible to refer to a generic intervention treatise for existing buildings.

**2.2.6 Section D: Installations supplied to each room:** The Quick survey system analyzes in this phase the knowledge of the installations each single living unit is equipped with. This is done to check their reversibility or the possibility to replace them with new installations that have to meet existing structures.

Figure 4. Paper forms title page relative to the section: installations supplied to each room.

Plant engineering is usually the most neglected part of a survey,

on the contrary we think it is important to acquire and classify the outfit of installation technologies present in the building in order to outline a general picture of the building condition and of its functional character and habitability.

Installations card-indexing is presented in quite a complete form although it lends itself to improvements and extensions. Survey strategy is developed following two investigation levels: the first one takes in consideration the building unit as examination unit which allows a global understanding (also useful for a general, not in-depth analysis in case interiors study is not required); second level considers the room unit, the least element of the building unit which enables to check the presence of those elements that characterize the single installations. In such a way both the presence and the functionality of the existing equipments will be established.

### 3. CONCLUSIONS

#### 3.1 Data processing through card-indexing

The basic logic system that processes data collected by card-indexing is so structured to carry out the study of the existing situation according to different professional needs. The flexibility of the structure allows to work with different scales starting from the largest one (the historic centre, the district; the block\*) up to the least one (the room), going through the building unit. As previously mentioned, information management can be done by mean of a DATABASE. The functionality of this working method provides for a screening of “reality” through a pattern of data collected in a unique “information container”. According to this logic we have set-up sections that can be filled-in independently and without distinction (or as a whole), without missing those general information that permit to locate the territorial position. This method can be basically used to represent and handle through cards all those information relative to the survey of the reality; it can as well explain all those situations that can interfere between the components of the building such as materials, building techniques, conservation degree and structure with the purpose of defining the functioning of this whole. The card has to be exhaustive for all those elements representing the condition of the building (areas, materials, deteriorations, pathogens etc.), and flexible enough to suit all present combinations. The typicality of the card is to be able to link all material and pathogen situations that interfere between the various elements, to the classic geometric representation of reality; To these data we enclose the description of the decay situations that can be defined one by one and quantified in square metres.

#### 3.1.1 Output to different scales

By this scale the building unit\*\* is the least studied element. The block, that by definition is that urban portion delimited by transit streets, can consist of one or more buildings. Purpose of the survey is to estimate the existing situation relating between them one or more components of the city fabric according to present characteristics, to static behaviours and to the

\* By district we mean an urban area consisting of different blocks; the block, broadly speaking is a ground portion surrounded by streets that isolate the block from the rest of the city. More precisely it is a portion of urban territory delimited by public streets (or private ones open to the public) or by public areas in general, were these are already existing or foreseen by a town planning scheme.

\*\* The building unit consists of a whole generally made of more living units; it has a three-dimensional development and has functional, static and figurative autonomy.

physicality of external elements (structures, materials and their preservation conditions, installations). The living unit\*\*\* is on the other hand the least survey object, with regard to buildings. The living unit, intended as spatial entity able to satisfy the requested functions (living or other) is the least element of study consisting in one or more rooms. The card-indexing of the living unit enables us to analyze all the building internal components (form the structural, material and equipment point of view) allowing a whole estimation. An eventual analytic

card-indexing of technologic elements will have the single room as object of study and the living unit as synthesis element.

\*\*\* The living unit consists of a spatial organism of small dimension, assessed by land register, able to independently satisfy the functions for which it has been assessed (or it can be). It may coincide with a flat, a shop, a warehouse etc..

| <b>SCALA URBANA</b>  |                                    | Oggetto di analisi: LE UNITÀ EDILIZIE  |                                  |
|--|------------------------------------|--|----------------------------------|
| <b>N° UNITÀ EDILIZIE RILEVATE</b>  |                                    |  |                                  |
| Vengono riassunti i dati parziali delle singole unità edilizie in <u>TOTALI</u> per quello che riguarda: |                                    |  |                                  |
| <b>A – caratteristiche urbanistiche generali</b>   |                                    |  |                                  |
| <b>B – materico patologica fronti esterni, elementi strutturali e coperture</b>                          |                                    |  |                                  |
| ➤ <b>Suddivisione per tipi di destinazione e metri quadrati per piano</b>                                |                                    |  |                                  |
| Es.:   | piano Int.                         | Totale METRI QUADRATI.                 | Suddivisi per destinazioni d'uso |
|  | piano Semint.                      | Totale METRI QUADRATI.                 | Suddivisi per destinazioni d'uso |
|  | piano T.                           | Totale METRI QUADRATI.                 | Suddivisi per destinazioni d'uso |
|  | ...                                |  |                                  |
|  | piano x.                           | Totale METRI QUADRATI.                 | Suddivisi per destinazioni d'uso |
| ➤ <b>Suddivisione per tipi di alloggio presenti</b>  |                                    |  |                                  |
| Es.:   | Casa unifamiliare                  | n° x                                   |                                  |
|  | Casa bifamiliare                   | n° x                                   | ..... ecc.                       |
| ➤ <b>Totali dei dati quantitativi</b>  |                                    |  |                                  |
| ➤ <b>Suddivisione per indice di comportamento statico presenti</b>                                       |                                    |  |                                  |
| vengono segnalati gli elementi come indici di pericolosità   |                                    |  |                                  |
|  | Edifici isolati                    |  | n° x                             |
|  | A schiera con gronde non allineate |  | n° x                             |
|  | A schiera con colmi non allineati  |  | n° x                             |
|  | Accorpamenti in età diverse        |  | n° x                             |
|  | Presenza di più piani fuori terra  |  | n° x                             |
| Questi 5 termini sono quelli fondamentali che devono essere riportati come parametri di pericolosità     |                                    |  |                                  |
| ➤ Suddivisione per <b>elementi strutturali:</b>  |                                    | totali dei materiali e delle patologie |                                  |
| ➤ Suddivisione per <b>struttura delle coperture:</b>   |                                    | totali dei materiali e delle patologie |                                  |
| ➤ Suddivisione per <b>paramenti:</b>   |                                    | totali dei materiali e delle patologie |                                  |
| ➤ Suddivisione per <b>coperture:</b>   |                                    | totali dei materiali e delle patologie |                                  |
| ➤ Suddivisione per <b>elementi di chiusura e loro finiture :</b>   |                                    | totali dei materiali e delle patologie |                                  |
| ➤ Suddivisione per <b>Pavimentazione perimetrale esterna</b>   |                                    | totali dei materiali e delle patologie |                                  |
| ➤ Suddivisione per <b>impianti esterni</b>   |                                    | totali dei materiali e delle patologie |                                  |

Figure 5. The database processes information satisfying operator's needs, following above example, which summarizes the question positions of the town planning scale.

| <b>SCALA UNITÀ EDILIZIA</b>  |                              | Oggetto di analisi: L'UNITÀ IMMOBILIARE |  |
|--|------------------------------|---|--|
| <b>NUMERO di serie dell'UNITÀ IMMOBILIARE</b>  |                              |   |  |
| Da cui si può accedere a ogni unità immobiliare per approfondire i dati corrispondenti   |                              |   |  |
| <ul style="list-style-type: none"> <li>• <b>Totali caratteristiche scala urbana</b> riguardo le informazioni esterne e strutturali</li> <li>• <b>Totali caratteristiche delle unità immobiliari</b></li> <li>• <b>Totali caratteristiche della singola unità immobiliare</b> riguardo le informazioni interne</li> </ul> |                              |   |  |
| <b>dati della UNITÀ IMMOBILIARE</b>  |                              | <b>N° di UNITÀ STANZA</b>               |  |
| ➤ <b>n° stanze - piano</b>   |                              |   |  |
| ➤ <b>Dati planivolumetrici</b> superficie pavimento – sup. soffitto – sup. pareti  |                              |   |  |
| ➤ <b>PAVIMENTI</b> approfondimento si/no   |                              |   |  |
|  | Materiale(n) e Patologia (n) | metri quadrati                          |  |
| ➤ <b>SOFFITTI</b> approfondimento si/no  |                              |   |  |
|  | Struttura Materiale(n)       | metri quadrati                          |  |
|  | Tecnica                      |   |  |
|  | Patologia (n)                | metri quadrati                          |  |
|  | Finitura Materiale (n)       | metri quadrati                          |  |
|  | Patologia (n)                | metri quadrati                          |  |
|  | Controsoffitto Materiale (n) | metri quadrati                          |  |
|  | Patologia (n)                | metri quadrati                          |  |
|  | Rivestimento Materiale (n)   | metri quadrati                          |  |
|  | Patologia (n)                | metri quadrati                          |  |
| ➤ <b>PARETI</b> approfondimento si/no  |                              |   |  |
|  | Struttura Materiale(n)       | metri quadrati                          |  |
|  | Patologia (n)                | metri quadrati                          |  |
|  | Rivestimenti Materiale (n)   | metri quadrati                          |  |
|  | Patologia (n)                | metri quadrati                          |  |
|  | Finiture Materiale (n)       | metri quadrati                          |  |
|  | Patologia (n)                | metri quadrati                          |  |
|  | Decorazioni Materiale (n)    | metri quadrati                          |  |
|  | Patologia (n)                | metri quadrati                          |  |
| ➤ <b>PORTE – FINESTRE – LUCERNARI (idem)</b>   |                              |   |  |
| ➤ <b>IMPIANTI IN DOTAZIONE AD OGNI SINGOLA STANZA</b>  |                              |   |  |

Figure 6. The database processes information satisfying operator's needs, following above example, which summarizes the question positions of the building scale.