THE PROTOTYPE OF THE INFORMATION SYSTEM FOR DIAGNOSTIC OF VENETIAN BUILDING (SIDEV)

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Riassunto

Il prototipo del Sistema Informativo per la Diagnostica dell'Edilizia Veneziana è un'applicazione webmap che permette ai gruppi di ricerca l'inserimento dei dati delle proprie attività secondo un'architettura distribuita client-server. Le funzionalità del sistema derivano dall'analisi dei requisiti e delle interazioni tra utenti e sistema: interessano principalmente l'inserimento dati, la consultazione e la ricerca. Il SIDEV utilizza basi cartografiche provenienti da Corila, che invece di essere duplicate, corrette, o modificate, sono state arricchite di tematismi derivanti dalle attività di ricerca.

L'esperienza del SIDEV ha evidenziato l'importanza del progetto concettuale e dell'analisi dei requisiti come fasi strategiche nella progettazione e nello sviluppo del sistema. Fasi che devono essere condivise tra tutti i gruppi di lavoro, produttori di dati e progettisti del sistema. Le potenzialità del sistema come supporto alle analisi pre-intervento sull'edilizia veneziana riguardano principalmente: il riconoscimento di SIDEV come base comune dei gruppi di lavoro, la crescita di SIDEV attraverso l'incremento del database e la definizione di nuovi criteri di ricerca, il potenziamento di SIDEV attraverso la verifica della sua efficacia nelle analisi pre-intervento e di diagnostica.

Abstract

The SIDEV (Sistema Informativo per la Diagnostica dell'Edilizia Veneziana) prototype is a diagnostic information system for Venetian buildings. It is a webmap application that allows research groups to contribute data from their studies using client-server architecture. Information system functionalities derive both from extensive analysis of the requirements of end users together with system analysts. Main functions aredata entry, data retrieval search and presentation. The SIDEV uses Corila's cartography, that instead of being duplicated, corrected, or modified, are served via standard OGC services to elaborate thematic maps, derived from research activities.

SIDEV's experience has underlined the importance of the conceptual project and of requirements analysis as strategic phases in system planning and

implementation. These phases must be shared between: research groups, surveyors and data providers and system designers. The SIDEV information system is a support system for pre-intervention analysis Venetian buildings. Itspotentialities can be fully expressed once it becomesa common base for all research groups. Only then the size of the data collected will allow the definition of new tools for extensive analysis and retrieval and SIDEV will expressits effectiveness for evaluation and diagnostic in the pre-intervention analyses.

1 Introduction

The working group WP5 has been responsible for developing information system SIDEV prototype application(Information System for Diagnostic Of Venetian Buildings), designing and implementating a support tool for the research project to help research groups sharing knowledge. The application domain is architecture and territory preservation.

2 System design

SIDEV's prototype application is made of a tool for data entry and retrieval of data gathered from on-field inspections of buildings, including phographs, quantitative and qualitative data. SIDEV's webmap application presents this data geographically, importing information from other sources. The prototype implementation is the result of the analysis of requirements, raw data and interactions between the system and its users. The products of this phases has been the UML model of the information system, formalized in use cases and classes diagram.

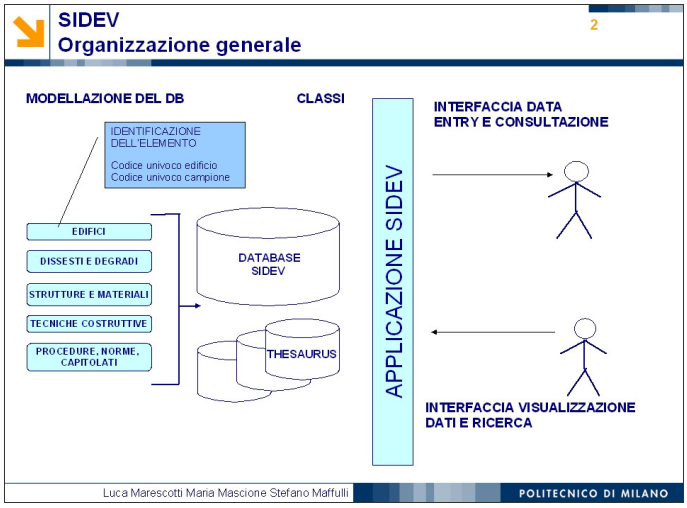

Fig. 1 – SIDEV, general scheme.

2.1 Data sets

The database stores in entity/relations schema data about buildings; constructive techniques; structures and materials; damage and mechanisms of

damage, phenomena of deterioration; geometric and photogrammetric survey; rules of procedures, norms and specifications. The database allows for the necessary generalizations for rational analysis of data. To improve interoperability of information, all the elements that describe the buildings, like constructions techniques or styles, are stored in separate multidisciplinary thesaurus shared between all work groups. This approach allows for multidisciplinary exchange of information and increases the usefulness of the system (Fig. 1).

2.2 Requirements

Functional requirements concern two areas: data entry and retrieval. The interactions have been identified working together with research groups on the field, looking at the recording material used. Mainly these are based on paper, photos and on sets of classification terms. A lot of work has been done to simplify and homogenize such classifications between workgroups. Most of the differences existed in the terms used by groups dealing with modern architecture and those studying historical buildings. The guideline has always been not to duplicate any information already available and use open standard based solution to increase systems interoperability. The requirements have been prioritized and translated into functionalities of the prototype in agreement with the working groups.

2.3 System architecture

The system's architecture is distribuited, client-server architecture, based on open standards. The overall design takes into account that working groups were distributed in different cities (Fig. 2). Its open architecture allows also for incremental addition of information from results of later investigations, making it possible for the information to grow over time.

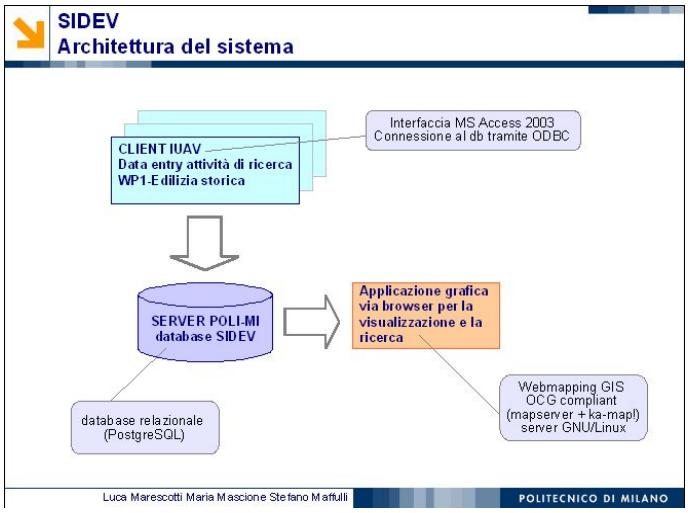

Fig. 2 – System architecture.

3 Functionalities

3.1 Data entry interface

Custom user interfaces have been developed using MS Access to allow researchers of the work groups (Fig. 3). The classes diagram has been implemented on top of the open source object-relational database PostgreSQL with spatial extension PostGIS. The choice to use MS Access was due to the rapid interfaces prototipization and its convenience while the open source client/sever architecture allows the development of the solid base necessary to build on top for future research. Data stored on PostgreSQL can be easily moved to the Oracle backend used by Corila, should the need arise.

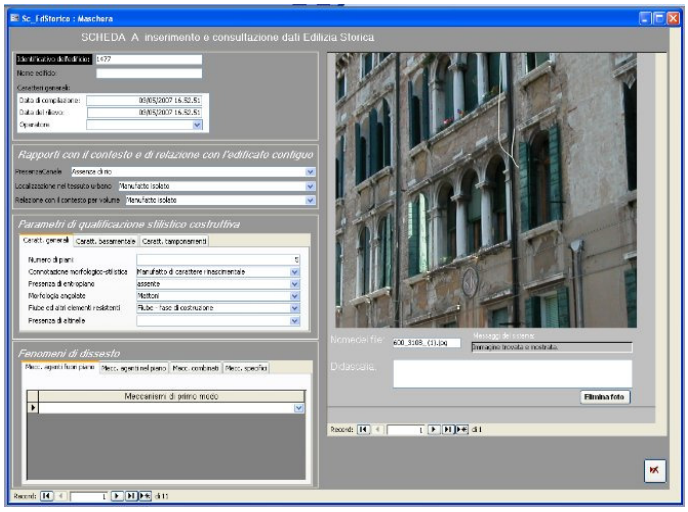

Fig. 3 – Data-entry form.

The close collaboration with work group 1-Historic building has allowed to validate the graphic interfaces, both that concern data entry and online retrieval.

3.2 Data display interface

Geographical display interface has developed based on use cases written in collaboration with all other working groups. The solution is based on the open source webmapping framework ka-map, wich sits on top of well know open source mapserver. The data system are displayed according to specified themes that the user can activate autonomously:

Context and relationship

- Presence of canal
- Context relationship
- Location

- Number of floors

Constructional parameters

- Presence of deflection toward inside
- Corner's morphology
- Resistent elements
- Presence of altinelle
- Characteristic of the base portion
- Type of wall-plug

Structural instabilities

- Mechanisms that's operate out of plan
- Mechanisms that's operate into within the plan
- Combined mechanisms
- Specific mechanisms

Legend description is taken from thesaurus.

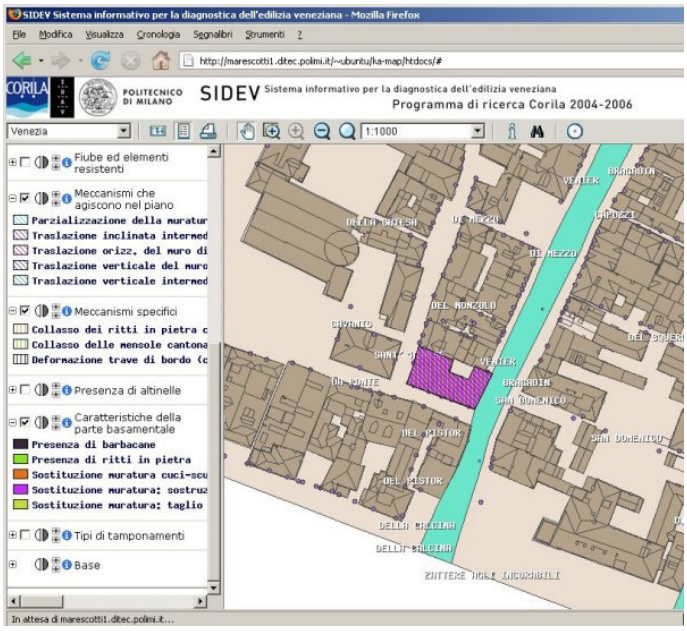

Fig. 3 – Screen shot from webmap application.

3.3 Search rules

The system, allows to identify zones or specified buildings through alfanumeric and graphical research criteria :

1. using an Ajax based form entering sestiere/district and civic number, or rio and island;

2. visually through “point and click” on the map zoom and pan.

3.4 Enclosed documentation

All binary data about the building, like photographs or laboratory tests, are stored in the database as binary blobs.

4 Hardware e software characteristics

The spatial database is the PostgreSQL server with the spatial extension PostGIS, running ion MS Windows operating system.

The geometries of venitian buildings could not be loaded from an OGC compliant map server, so mapinfo files had to be loaded into the spatial database SIDEV.MIF: civici.mif, edifici.mif, tetti.mif, isole.mif, toponimi.mif, toponimicanali.mif. The spatial corresponding tables are sp_civici, sp_edifici, sp_tetti, sp_isole, sp_toponimi, sp_toponimicanali.

The interface for data entry and buildings case study retrieval in a MS Access 2003 application. A control panel allows the thesaurus update, the retrieval and data entry. The connection with is realized through a ODBC driver. The security and the accesses control is managed on the ODBC connection: only qualified users can access at server database through MS Access application.

Webmap application has realized trough the Open Source mapserver, on GNU/Linux server.

Graphic application through browser has been developed on the Open Source framework ka-map!.

5 Interoperability and standard

While developing SIDEV it was necessary to reach interoperability on two levels: on one side there was the technical transport level, to move information from different Corila systems and to the wider public. On the other side there was the need to develop semantic agreements between different research groups of the Architecture and cultural asset group.

Interoperability for transport of information allows access to data from Corila research to different applications using existing standards developed by international groups like the Open Geospatial Consortium (OGC), World Wide Web Consortium (W3C) or International Organization of Standardization (ISO).

SIDEV is based on the concept of reuse of available information, avoiding duplications. Cartographic leves can be imported from sources like feature servers and map server using OGC web services.

Since RIVELA database is not yet capable of serving web maps, it was necessary to load geographic layers in the PostgreSQL database from Mapinfo files. This doesn't preclude the possibility to add to the SIDEV prototype layers from other OGC sources.

It wasn't as simple to define an internal standard for the working groups for the semantic of information. Thesaurus were necessary and a long work of coordination was activated to allow multidisciplinary approach to work. Without the agreement on semantics and simplificiation of thesaurus it would be impossible to extrapolate meaningful information from the data entered by the research groups.

Conclusions

The SIDEV's experience has to pointed out the importance of conceptual project and requirement analysis as strategic phases in design and development of the system. Phases, that must be certainly shared between data providersand future users of the system, that depend from specific skills dedicated at design system. The achieved result allows to identify clearly the development prospects, which can develop in three directions:

- The first concerns the growth of the system throught the database enriching and the definition of new criterias that allow analysis mutch more in-depth, as well as extension of the system in integration with Corila systems.

- The second concerns the system use that dipends from SIDEV recognition as common base of the work groups and accessibility informations.

- The third direction concerns the strengthening of SIDEV effectiveness reachable through the comparative review of the information, the verification of its usefulness for analysis before execution and diagnostic analisys, and the archival of the restoration work done to evaluate their effectiveness.

The cultural presuppositions of these development directions are researchs integration, the coherence of work groups, the interdisciplinary knowledge, and buildingan “operative and control room” for the built ecosystem, of wich Corila can become a focal coordinator. The results concern the possibility of transfer of experience to other fields, where various work groups are involved whith

different heterogeneous background, but whose works must integrate theiself to provide a common development of knowledges.

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SIDEV: design and development credits

Data cataloguing: IUAV, DSA.

Design and development: Politecnico di Milano, BEST.

Webmap development: Ominiverdi.org.

Development software: Linux/Windows xp; ka-Map!; Mapserver; PostgreSQL; Postgis; Apache Php.

The prototype SIDEV is available on
http://marescotti1.ditec.polimi.it/~ubuntu/ka-map/htdocs/