

A WEB GIS PROTOTYPE FOR MONITORING THE ENERGY EFFICIENCY OF PUBLIC BUILDINGS

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BACKGROUND AND OBJECTIVES

The European Directive 2002/91/EC on the energy performance of buildings strongly recommends an exemplar approach by local public administrations towards the energy and environment and their submission to the energy certification. Concerning the Italian context, some institutions are working on the implementation of Energy Efficiency Plans, however, the analysis of these realities and documents put in evidence the lack of suited tools for the analysis, evaluation and monitoring of realized or planned interventions.

The principal objective of the research has been the design and the prototypal realization of a web gis platform to gather, publish and query information on energy performances, thermal and electrical consumption, environmental parameters and greenhouse gases emissions, concerning public buildings.

The aim of the research is also to design an application infrastructure for data management 'service oriented' through the use of international geographical standards, in particular the Sensor Web Enablement (SWE) defined by the Open Geospatial Consortium (OGC), a suite of specifications related to sensors, sensor data models and sensor web services.

APPROACH AND METHODS

The research has been carried out starting from the identification of user and functional requirements conducted on an Italian public administration and by designing an application suitable to support both expressed needs, and deductible potential requests. The architecture has been subsequently verified in order to highlight the limits and evaluate possible interventions to overcome them.

The main activities fulfilled under the research have been:

- 1) analysis of sensors for energy and environmental monitoring (consumptions, internal and external temperature, etc.), Open Geospatial Consortium standards (SWE, WMF, WMS, etc.), standard compliant architectures;
- 2) definition of the application objectives and needs expressed by the potential users: Energy Manager, administrative staff, Citizens;
- 3) verification of existing data and archives and processes of interest;
- 4) definition of functional and non-functional system requirements;
- 5) choice of sensors and technologies;
- 6) design of the data model and architecture.

RESULTS

On the basis of the standards analyzed it has been possible to design the web gis architecture, provided by all the specified functionalities and which uses the OGC services, in particular SOS (Sensor Observation Service), WFS and WMS in order to access, process and modify the data.

Given the inherent characteristics of the application, during the project the need to represent the entities - building, thermal zone, opaque element, transparent element, etc. - of the data model in 3D space has been emerged. This model should contain geometry and semantics and include all the necessary analysis of the situation and every essential element to access other data on the system.

The format for data storage is crucial to ensure the reusability and versatility of the project. Since the research is based on the use of standards, the applicability of CityGML for three-dimensional representation of urban entities has been studied and verified. Finally, an additional specific schema based on existing schematic CityGML has been defined, using the extension CityGML Application Domain Extensions (ADE).