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SECOND IES INFORMATION TECHNOLOGY CONFERENCE

Proceedings Volume 2

SECOND IES

INFORMATION TECHNOLOGY

CONFERENCE

Advances and Development in

Information Automation

Organised by The Institution of Engineers Singapore

PROCEEDINGS OF THE SECOND IES INFORMATION TECHNOLOGY CONFERENCE

4-6 July 1991

Raffles City Convention Centre, Singapore

Volume 2

Advances and Development in Information Automation

Sponsored and Organised by: The Institution of Engineers Singapore

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ISBN: 981-00-2840-7

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Geographical Information System Project for Public School Buildings Stock Management

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Abstract:
The goal of the project is to investigate the conformity to usage of school buildings existing in a entire region of Italy. The purpose is the use of a GIS to manage the information on quality of location, function and structure of pubblic school buildings. This helps in making future planning decision for the region Authority. In particular this system shows school buildings that are below acceptable quality standards. This allows the uses to make a ranking based on quality and establish priorities.

Objective of the project

The model should allow a fair collection of data to be used in the region to operate a technical decision making and budget financial resources for school facilities.

The models provided by the burocratic sources are rigid compared with the actual increasing variety of the problems Authority is facing to operate a sistematic planning activity. Futhermore the need of verifying how suitable different schools are, implementation of the new programs is added to already existing problems especially in the case of less innovative schools. In such cases schools are totally inadeguate to the education needs and often to the habitabilty standards.

The model provided by the data analysis can helps to solve a variety of problems. The model should allow optimization for schools in the excellence stock, as well as show inadequacy of schools in the guardianship stock. The lack of facilities in schools varies largely. The excellence stock of buildings schools mostly need advanced tools like computers or sophisticated improvements of the environmental performances (like acustic improvements). On the other hand the guardianship stock of buildings schools are in need of basic facilities (like classrooms or labs).

Furthermore in Italy, particulary Tuscany, historical buildings are often used as schools so that financing and restoration are managed by different institutions.

The model of the information system should be flexible for different technical programs in the region. It semed necessary to use advanced tools for collection and analysis of data. On such technical goals is based our information system for data collection on the territory.

The data model

The objective of the model is to come up with a complete description of structure and usage of school buildings. Such description should allow qualitative evaluation of schools buildings and allow collection of data to be compared with others infrastructure's data bases interactive with the school model (like transportation). Besides that all data must be geographically related and refered to regional base cartography.

Comparison and evaluation are made between data collected and the standards imposed by law for public buildings (1) (2) as well as for school buildings(3).

New standards are introduced to evaluate the comfort of the interior of the school buildings. This way the satisfaction of users is measured using parameters not taken into account by any norm.

Technical goals defines the inputs for the information system. The model was developped in two phases:

1. macroanalysis
2. microanalysis

We found three levels refered to phase 1:

1.1 Territory to refer to
1.2 School infrastucture
1.3 System interacting on the territory.

Phase 2 includes two steps:

2.1 Entities analysis
2.2 Individuation of data classes

The first step of the project is the definition, collection and validation of data concerning school infrastructures; such data are to be collected using tools from the orderer. For this purpose the individuation of data classes was refered to a meaningfull zoning of the territory (Italy is divided into provinces).

In phase 1 of the project the data record format has been established according to the following four modules concluded from microanalysis:

a)Spatial location
b)Functionality of the space
c)Interior comfort
d)Technical level

Through the SRL program it is possible to check the usage of data in real time. One can also perform error analysis using intermediate information and forecast data.

Later we plan to aquire the regional base cartography through the GIS (Geographical Information System). The geographical reference of the data, collected on school infrastructures in fhase 1, allows one to set up maps.

During the last phase of the project, different information on systems interacting with school infrastructures, is integrated with our system.

In the microanalysis step information modules, function and data of interest for the macrolevel of systems interacting on the territory are pointed out. The goal is to merge into the GIS other data bases: regional national or external sources. We distinguish classes of data concerning:

-Administrative boundaries (Town General Planning, etc..)
-Transportation infrastructure
-Infrastructural network (roads, highways, railways, etc.)
-Antropic social and economic data
-Environment.

Availability of data in the classes mentioned above leads to a more complete analysis and better planning. For istance priorities can be established on action to be taken on historical buildings based on environmental data.

The system supports studies on optimization of school location in relation to school age population, rate of population growth and trasportation facilities, as well as to forecast future usage of existing buildings so that plans can be made to build extra space or utilize the existing one differently.

By providing a relational data base, the GIS should allow one to monitor the system of schools in the region: to define priorities and to stimulate and control complex situation on the territory involving schools and related infrastructures.

The system can be used to integrate different functions and computer technologies of the region Authority.

Data collection.tools

Data was collected using a different set of records for each school level (preschool, elementary, middle, high). We distinguish two types of data:

-General data of identification and location
-Data specific to a school level.

The first field of the record is common to each school level and is the key to get a specific record. However retrievals can be made using any field of the record through specific queries.

The first field of the record contains information regarding name, location and age of each school building. Later fields contain information on quantity and quality of classrooms and other facilities. We can also find data on comfort of such spaces.

On a local level the system helps to come up with project for future construction or update. For example:

-Definition of building profile (made by dimension, functionality, comfort etc.);
-Evaluation of how accessible schools are
-Etc.

Comparision of such data with data concerning experimental programs may become a very important factor on decision making.

The data base, as used by an information system geografically related may help law and decision makers at different levels:

-Region Authority for planning and programming
-Provinces and Communes for actual actions;

further the Provincial Education Offices may decide new experimental programs on a realistic view of the infrastructural support.

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A COMPUTER EXPERT FOR COST AND TIME ESTIMATION OF PROGRESSIVE DIE TOOLING

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Abstract

One of the time consuming steps as well as a critical path in the establishment of a new product line is the design, manufacture and procurement of a new production tooling generally used for fabrication. With many tools being developed and launched under tight production schedule, the cycle time for the production of these tools is critical. The timely acquisition of tooling is important for business to meet the deadlines of releasing new products to the marketplace. There are no simple computer expert methodologies that can work in an interactive mode and aid tooling and manufacturing engineers in die estimation. The need for an intelligent system comes as a result of the demand and pressure to reduce the tool development cycle time and accurate prediction of the total cost. This research looks at a design methodology of an expert system for the estimation of stamping dies. The expert system is responsible for gathering all the information about a die set, and output with reasonable accuracy a cost and timing estimate for the fabrication of the complete die tool. The present approach in the knowledge base representation is based on an explicit data base, a well specified language for encoding the knowledge, and an inference engine for user interface. The results are expected to generate timing charts and assist the designer in interaction with the knowledge base to produce tooling estimates.

Introduction

Whenever a new product is developed involving thousands of components, it results in not only hours of design and prototype development time, but also many hours of cost estimation to arrive at the total manufacturing cost. The request for an expert system comes as a result of the demand and pressure to reduce the tool development cycle time and to more accurately predict the cost of tooling for the manufacturing industry.

The aim of this research is to look at the available cost models for tool and die design and to propose a computer based expert to accomplish the analysis in a fraction of the time. The expert system will be used by tooling design engineers to calculate both the overall cost and acquisition time to build a complete die set given a complete part design and preliminary die layout. Unlike its human counterpart, the computer expert can accommodate later changes to the part layout and recalculate cost and time figures rapidly. This could help bring tooling in within required cost and allow estimation of several layouts for the same part, allowing the designer to choose the most cost effective method of production.