Public Participation GIS for re-development support in European Historic City Centres
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ABSTRACT

Many European towns and Cities have ancient origin and their historic centres may be considered important resources to be preserved. They store European Cultural Heritage in their high artistic and historic valuable assets and local identities they represent. A knowledge-based creative approach is required to foster re-development actions capable to enhance quality of life and to stem strong pressure of globalisation forces.

Developments in ICT *(Information Communication Technologies)* and the change towards a European *new economy* in the last decade has given favourable ground for the rapid growth of a new *Information Society* within which new forms of democracy started to take place. European Institution foster the implementation of new form of e-government according to principles of subsidiarity, transparency and public participation.

Recent research trends find interesting issues for further development in the access of public information and in the development of online public participation processes in spatial planning and decision-making. In this case Information is characterised by a strong relevance of the spatial dimension. Nowadays IT offers a wide range of tools for online Geographic Information (GI) management. Different client-server architectures allow design and development of online-GIS suitable for specialist and the wider lay-public. In this way it is possible to offer user-friendly Information to stakeholders with different technical background and different interests.

However, in the study of these innovative process doubts and questions rise due to socio-cultural conditions rather than technology.

In the light of these considerations the authors aim to discuss some methodological issues about online GIS design for historic city centres re-development planning and management support.

The City of Cagliari, Italy case study is presented and some general issues for further research development are proposed.

1. SOME ISSUES ON HISTORIC CENTRES RE-DEVELOPMENT

Nowadays in Europe some 80% of the population live in town and cities. In these urban areas many centres shows serious symptoms of physical and social degradation. In the last decades after the slowing down of centrifugal urban sprawls, exploded during the Post-WWII, many European town and cities faced a renewed interest for their historic centres. Upper class residence, commercial business, services still find in the historic centres preference for locational choices. Actions urge to adapt the ancient urban fabric of historic centres to actual need and quality of life standards. The need of urban renewal demanded by the historic centres re-development process has to be paralleled by social and economic revitalization. Moreover we should conceive re-development process as physical as well as social in order to augment quality of life and to preserve local identities, which are a relevant part of the European Cultural Heritage and contribute themselves to quality of life enhancement.

In Europe often settlement birth dates back to roman and even pre-roman origins; it means that many actual town and cities have evolved slowly trough time till the recent fast acceleration. Monuments, archaeological assets, history, urban fabric, as well as community's lifestyles are only few of the factors we should take into account when planning into the historic centres. Which approach should we use in planning and governing historic centres re-development? Conservation or transformation? Is there any universal recipe for better act? European Spatial Development Perspectives (Commission of the European Communities, 1999) suggests only a minor part of assets worth to be preserved according to protection measures, while the rest may be transformed according to a creative approach. After the urgent evaluation of risk factors and the management of critical situation we should propose a creative approach bearing in mind that spatial development influence Cultural Heritage transmission to future generations.

Whatever might be the approach, re-development process should be based on a deep knowledge and understanding of the urban environment from the socio-cultural, economic, physical and legal points of view, which actions have to be coherent with. In this framework Information and Communication Technologies (ITC) may offer an operational and strategic support in knowledge-base construction and management for the re-development process.

To this end Multimedia Geographic Information Systems can be implemented in a networked environment in order to support analytic and negotiative phases of planning and decision-making. While every planning process involves a set of stakeholders, which have different interests and background, which have to negotiate alternative solutions, the historic centres re-development often demands the dwellers direct intervention in order to perform the actions.

Effective combination of tools and techniques can be used aiming at closing the "gap of understanding" between technical specialists and all the other re-development actors.

2. TOWARDS AN INFORMATION SOCIETY FOR ALL.

With the development of ICT the and the coming and widespread diffusion of the Internet and of the World Wide Web, European Institutions have driven the potential role of the new media as economic development engine. A policy framework has been developed to bring Europeans into the Digital Age. Trough the e-Europe initiative European Commission furthers joint efforts together with Member States, Industries and citizens to built a "on-line ground" to develop a new economy mainly driven by the Internet.

Within the e-Europe initiative ten priority areas are proposed in order to create a socially comprehensive, digitally literate Europe and to bring Europeans, business and administration on-line; among them the "government on-line" priority area seems to open new possibilities from which arise enriched scenarios for a wider access to public Information and, as a consequence, also public GIS implementation on the Web.

Besides, with the document "Dialogue on Europe" adopted by the European Commission on 15th February 2000, the decision to open a public debate with Europeans on the challenge of the European institutional reform by using new technology available such as Internet and the WWW, confirms the trend towards democratisation of decision-making. The lack of political has been, in fact, one of the main constraints to the diffusion of public involvement in decision making via Internet. When decision-making become spatial decision making the geographic component of Information need special tools to be represented, to be analysed. To supply an effective (geographic) knowledge, Information has to be understood by consumers. GIS has been proved to be not only able to supply effective operational support but also to be a decision aid tool in spatial planning and decision-making.

While institutional conditions begin to offer a favourable framework for the development of participatory processes technology already offers reliable tools for collaborative decision-making support system development. As often happened in the history of GIS diffusion technology is a weaker constraint rather than cultural, organizational and institutional bonds.

From the first half of Nineties when the Internet begun to have diffusion widespread enough to consider the implementation of the first Distributed Geographic Information (DGI) applications on the Web, great developments have been done in web-mapping and online GIS fields. These developments have given on line access to GI in all of its multifaceted forms from the maps to the images, from the datasets to the reports allowing even complex analytic functionality. To the variety of applications, a variety corresponds of techniques and implementation strategies.

The client server architecture of the Web enables system developers to choose which amount of data is processed in the server and which one in the client, in order to produce Information depending mainly on hardware/software characteristic of the client and the server, the data transfer speed, and, last but not least, the user skills and his concerns. On the one hand, it is possible supply via Internet spatial data to skilled professionals which process data in their own GIS, in their own client; on the other hand it is possible to distribute spatial data (or geographic Information) and the user can display and analyse these data in his client by using a simple browser, perhaps with a plug-in, or an applet; in this case the user could be a professional in a field where problems have a spatial dimension, not very much skilled in GIS and with no his own GIS, or a user who have to solve a well defined spatial problem. Moreover there are a plenty of very simple applications available on the Internet, usually with only few GIS functionality, sometime with powerful processing behind, that give access to encoded Information such as maps (with output in light raster format) and texts. In this common case the user probably has never heard the acronym GIS or in any case couldn't care less what it does mean. Site locators, pathfinders, are typical application in this case. Plewe (Plewe, 1997) gives an exhaustive overview of the so called Distributed Geographic Information applications, the technologies, the implementation strategies, from which emerge the aspect which is important to underscore here that is the availability of a wide range of tools to develop user-friendly interface for very different kinds of user. The problem of representation in fact is one of the main tasks in implementing a system to be used by many different kinds of users such as in a collaborative planning process.

3. PLANNING, DECISION-MAKING, PARTICIPATION AND GIS.

With the widespread diffusion of Internet in Europe in the late 1990s, many municipalities started programs to establish a dialogue with citizens trough the net. Representing different metaphors they built new virtual places in the cyberspace. Virtual Cities offer traditional municipal services and new way of interaction with citizens. Trough virtual cities access to public information is augmented and new possibility arise to develop participatory process. However while many Digital Cities, meant here as Municipal Web Portal, offer citizens occasions for active participation in the civic life, often users are interested more in other services or leisure. Perhaps they are not ready yet to new for of online participation. According to Aurigi although nowadays technology allows the implementation of collaborative environments "to built more effective urban information systems we need to involve a plurality of actors in the design of virtual cities and link digital developments to more traditional activities and initiatives that aim at enhancing public participation (Aurigi, 2000).

Concerning with participatory planning and decision-making, in the last decade, researchers propose different way to use Distributed Geographic Information to support in several manners collaborative spatial planning and decision-making. Planning Support Systems (Klosterman, 1999), Group Decision-Making (Jankowsky and Nyerges, 2001), Public Participation GIS (Carver, 2001; Weiner et Alii, 2001), Group Decision Making (Laurini, 1998), Interactive Multimedia Planning Support Systems (Shiffer, 199x) are different names related to different aspects in using ICT tools as aid in planning, to quote only few of them. These research efforts in a way or another spring from the idea to use GIS, models, the Internet, multimedia, visualisation and other representation, communication and (group-) decision-making aid tools and techniques to achieve more effective planning processes.

According to the way how these components are assembled they offer functionality suitable to share information among a group of stakeholders involved in a decision-making process, or perform a strategic use of information to support choices among alternatives; with these tools it is possible to design systems tailored to calculate solutions or to build a common platform to foster public discourse, to support group-ware and so forth. This way bring towards a new way to consider GIS as a toll among others offered by ICT development, which is integrated in broader systems which are collaborative, communicative, a planning aiding.

This kind of application open new research challenge which need big efforts to be deepened in all of its multifaceted aspects but the politic trend and technologic development seems to offer favourable scenario to undertake such efforts.

4. THE HISTORIC CENTRES RE-DEVELOPMENT LABS

An ICT oriented approach has been applied in the research project of the Sardinian Historic Centre re-development Laboratories (HCDL).

The HCDL were instituted by the art. 7 of the Sardinian Regional Urban Planning Law n° 45/89[1]; they have been set up by the Councillorship for Local Bodies, Finances and Urban Planning of the Autonomous Regional Government of Sardinia (RAS) with the scientific supervision of the Dipartimento di Ingegneria del Territorio (DIT) at the University of Cagliari. The RAS and DIT signed a research agreement and in a period of four years, HCDL pilot projects were implemented in Sardinian towns and cities.

The HCDL are municipal bodies active in cities and towns where has been defined with a legal act the consistence of historic centres according to historic and cultural characteristics in order to foster and manage re-development processes; the main objectives of the HCDLs are:

The understanding the local context by means of the integration of the expert knowledge and the common one;

The construction of the environmental framework which preservation, safeguard and re-use action proposals, oriented to economic and social revitalization have to refer to;

The knowledge sharing for action admissibility definition;

The promotion of coherent actions with the model of local sustainable development.

These objectives are translated in a series of operative tasks to be performed at the HCDL such as:

proposal of sectorial projects and procedures for action development coherently with architectural typology and traditional local construction materials

Definition of environmental and infrastructural requirements for re-development actions;

Set up of standard models for intervention (architectural, economic and administrative);

Re-development proposals assessment for supporting planning and decision-making.

More operatively, physical renewal demand a knowledge-based process based on analytical and strategic activities such as:

- Definition of typo-morphologic attributes for classification of buildings; the output is in form of abacus and becomes the reference for development of a set of rules for preservation, re-development and re-use plans;

- Definition of an admitted transformation degree as function of indicators of architectural typology, materials and techniques for the objects of urban space;

- Guidelines proposal for admitted actions for classified objects;

- Economic evaluation of refurbishing action costs;

Given the HCDL role of advising and control body in the recovery of the historical centres, in the first years after their institution, the activities of survey and analysis of historical urban fabric and real estate, together with the socio-economic framework, began in the first set of Sardinian centres. The size of data collected and their wide variety of formats, together with the characteristic of the surveying techniques demanded from the first phases of the project the opportunity to arrange a set of tools for the digital information treatment.

The relevance of the spatial dimension in the objects measurement and the analysis of the built environment has oriented the choice towards Geographic Information Systems, capable to reference the description of single objects observed to their position in the real world. Different experimentations have been undertaken at the DIT, therefore, aiming at the development of Spatial Information technology methodologies and applications for the management of the recovery process. In particular a prototype has been designed and implemented for the historical centre of Cagliari (Campagna, 2001).

To the primary need to manage effectively collected dataset for analytical and operative operations, the will sprung to use the knowledge base available for the development of a communicative process among stakeholders and citizens. The latter play an important role in re-development process since if it were be based merely on public intervention and entrepreneurial projects without the active involvement of dwellers the risk would arise to have results of weak social sustainability and loss of local identity and cultural heritage.

In the light of these consideration the system design integrates models and functionalities of a multipurpose urban information system with representation and communication tools. Firstly a single-user GIS was developed, then a multi-user multimedia system was developed later. The data model of the system is proposed in figure 1.

The system structure allows the understanding and communicating of all the multidisciplinary aspects, which constitute the knowledge base and are the support to the recovery action management. The acquaintance process starts from the general, goes to the particular and goes back to the general trough different ways, analysing different aspects. This process gives the suitable output for all the actors. The planner need the widest range of Information and analyses and uses most of the system functionality. The search might start with socio-economic analyses at block scale in order to obtain a complete taxonomy of the socio-economic system. Then zooming to the parcel scale it is possible to integrate previous search with further analyses to define housing, property, land use or architectural systems. Finally the multimedia hypertext completes the search until the architectural detail. The professional, e.g. an

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[1] In Italy there are 20 regions which are responsible for regional spatial policies development, with differences among them coming from different regional autonomy and planning legal frameworks.

architect, which need Information about the recovery techniques, can quickly approach the thematic chart through a fast browsing, which through a few options, bring him from the homepage, which is the node from which the dendrite structure has origin, to the demanded chart. The owner can approach his building chart from the database on indication of the owner name and address or of the cadastral parameters and have information about transformation allowed. The address, because of the subsequent superfetations are
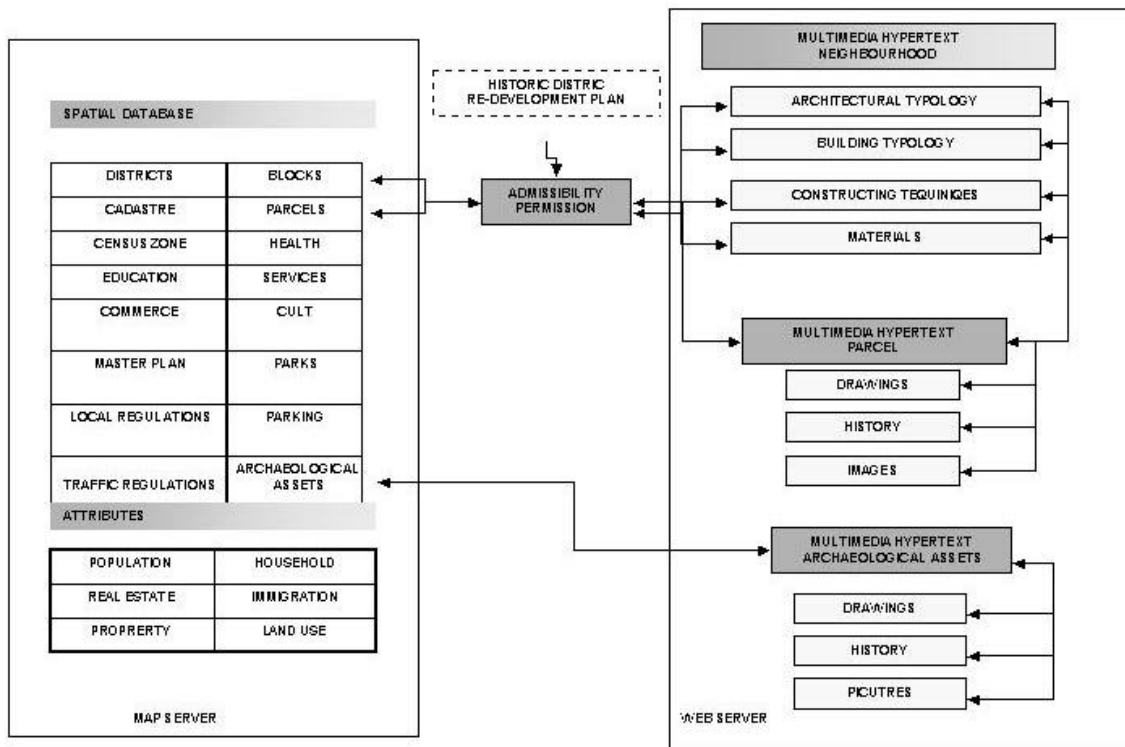
not always univocal; in those cases in which the owner does not have the possibility to immediately supply the cadastral parameters or in which there is not correspondence between them and the address it is possible use the digital map in order to find the building. From the building chart it is possible to directly go back to all the useful Information for the owner or the planner.

Figure 2:This scheme shows the general model of the system. Reference to the client-server architecture is given and to data format.
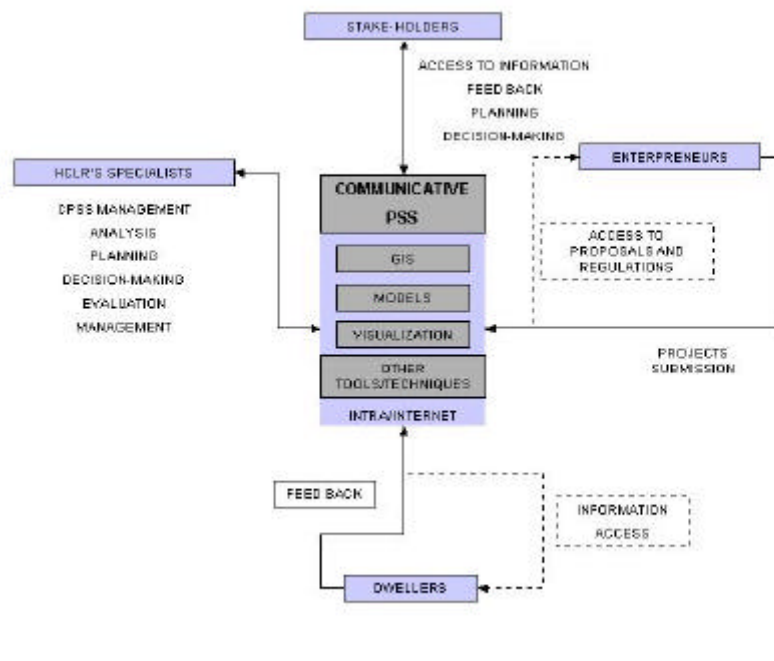
Figure 3: This scheme shows different access re-development actors may have to the systems

With a two-way protocol moreover users can integrate the knowledge base with other useful Information non available to the HCDL in other ways.

Figure 2 shows the different way re-development process actors access the system, which is here represented as a Communicative Planning Support System. Such a name derives from an architecture given by he integration of a GIS with other tools and techniques for planning support. The system is implemented in a shared environment and offer strategic support to planning and decision-making phases while perform management operational procedures. The shared environment can be realized in form of public information kiosk within the HCRL offices or in the WWW, being the same the core technology for the two alternatives. While the information kiosk offers public access to the system for people not yet connected or familiar with the Internet, the WWW version allows access to dialogic or negotiative activities differentiated in space and time.

5. CONCLUSIONS

Developments in Information and Communication Technologies offer new tools as useful support for spatial planning and decision-makings. Geographic Information Systems do perform reliable Information management and analysis when spatial dimension plays a substantive role in the understanding of given phenomena and forecasting possible scenarios. GIS alone cannot solve as a panacea all the problems in a planning process, but its integration with other ICT tools seems to offer the digital infrastructure for developing decisional process in the Digital Age. While planners should be careful to not adapt planning practice to these new powerful tools they should know and try to integrate them in effective ways to support planning processes which today trend to be based on communication. According to Klosterman (Klosterman, 1997) the planning view has evolved in the 1990s as "reasoning together" and "Information technology has seen as providing the information infrastructure that facilitate social interaction, interpersonal communication, and debate that attempts to achieve collective goals and deal with common concerns".

A case study is proposed in this paper aiming at showing how the above considerations can be applied in real planning processes. Even in particularly complex context, as it is in historical centres where the ordinary complexity of planning is augmented by special concerns such as Cultural Heritage Preservation and local community re-vitalization, it is possible to support planning and management with digital tools. Further research efforts are demanded to develop more user-friendly interface and to planners to integrate the many available tools in systems able to facilitate the integration of the expert and the common knowledge in participated process.

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