Virtual Studio of Design and Technology on Internet (II)

Student's experience

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1. Introduction

For about a year the members of our group have been working on their degree thesis focused on the project of the new intermodal node of Porta Susa in Turin. The theses are concerned with complex urban and architectural problems in the light of the innovations brought by computers and networks. The experience, up to now, makes us conscious that telematics is, and will be, more and more able to offer new tools and different methodologies to approach architectural design. Collaboration across computer networks has improved our design experience with systematic contributions from various skills and methodologies.

The presentation of our still on-going didactic experience has been subdivided into phases, strictly interrelated. The first one, almost over, is concerned with the analysis of the area and the representation of the collected data.

2. Analysis and description of the collected data

The analysis phase is based on the acquisition, collection and then presentation of the information on the area. Since professors and students from different universities are co-operating on the project, we have activated a Web site dedicated to documenting the stages of the design.

Analysis is a preliminary and important phase of the design, since the source of information influences the overall process of design. The analysis phase can be articulated in two specific moments: the first, which involves a limited number of people concerns the search for and preparation of the documents; the second, which involves a larger number of people, concerns the use, consultation, and discussion of the information.

The information on the area comes from different sources. Our experience is based on the use of both Internet and more traditional sources, e.g. bibliographies, historical maps and documents, photographs, etc.

Internet, more than any other tool, gives us simultaneous access to a huge amount of information, but the possibility of effectively using it depends on different factors. First of
all there is the possibility of building a system of relationships: the Web is conceived to improve structured access to information. We tried to use the Web to "capture" not only the information on the site, but also to gather the knowledge of the individuals collaborating in the design exercise, whether students or professors. Various architectural and planning Web sites offer on-line documentation of on going or already concluded projects. Surfing these sites is useful for comparing our work with designs and urban plans encountered elsewhere. In particular the WWW server of Turin City Council has proved useful because it offers the overall maps and regulatory plans of the city (Figure 1).
At present, no single program exists to deal with all the stages of the design, but rather several programs, each of which is more or less dedicated to specific parts or aspects of the design. These programs communicate with each other by means of common protocols or languages.

To set up the different phases of the study over the area of the “Spina2”, we used a series of different software, each specifically designed for the realisation of single parts or aspects. On the whole, every program is compatible with the others, thanks to the ability of each one to work or export its own work into environments or languages integrable in Internet.

During the analysis phase, the integration among the different programs and systems is achieved by the ability of the HTML to create Web pages; of the VRML to share 3D models of the site and the designs; of the Whip data format to publish C.A.D. two-dimensional drafts.

3.1. WWW

The initial nucleus of the Web site presents the result of the analysis over the area (Figure 2). The server delivers the historical documentation: maps, photographs, drawings, etc. Meanwhile, the survey of the area is made available: plans at 1:500 and 1:2000 scale, elevations 1:500 of the existing buildings, longitudinal and orthogonal sections. This information base has been particularly useful for the realisation of the 3D model of the entire area.
The two-dimensional part of the survey is drawn with AutoCAD R13 and exported on the WWW with the Internet Publishing Pack (Figure 3). This pack produces drawings in "Dwf" format, which offers some remarkable advantages: the drawings are still in vectorial format, but the file size is significantly reduced. The Dwf files can be visualised by the main WWW browsers by means of a shareware plug-in available at the AutoDesk’s site (Figure 4).
Several people have worked concurrently on the 3D model of the area. The overall model is shared on one server, while various workstations allow the creation or updating of single parts of the model. This model is used for several purposes. With 3D Studio Max materials, textures, lights, and points of view have been added to the model to make photorealistic renderings and animations. Images and animations aim to visualise the existing and designed buildings, to study the sunlight and the shadow-casting, to represent the traffic due to private and public transport.

Finally, the model has been exported into VRML Version 2 language. To the VRML model are added hyperlinks between objects, buildings and WWW documents. Hyperlinks between three-dimensional objects and two-dimensional documents offer an innovative way of interacting with information, to illustrate further aspects of the area and design. VRML Version 2 includes some tips to animate objects in the models. Further interactivity
is achieved with Java programming of geometry and objects. Java is a full-featured language which opens up unlimited capabilities to the programmer. Not every possibility is yet implemented in every VRML browser; in our model Java is used to increase spatial perception by means of 3D sound distribution. We use some of the Java capabilities to improve the animation of the model, to give an idea of the transport paths and of the “typical” noise of a specific place. Moving around in the model, one should be able to locate the source of a sound: for example, near the railway station one should be able to identify the trains as a source of the noise.

On-going experiments using Java are focused on greater interactivity with the site, e.g. elevators and taxis which one can pick up, and with the model, i.e. giving the designer the possibility of interacting on-line with the objects and forms.

3.2. Shared Virtual Reality.

Across the net it is possible not only to explore the 3D model of the site, but also to meet other people who are exploring it at the same time. A specific plug-in extends the exploration of VRML models to other users simultaneously connected to Internet. Each person who moves inside the models is represented by a 3D icon with human features (avatars), so that the other people connected to the model can see each other and communicate. Thanks to a Chat it is possible to exchange ideas and impressions through short notes or vocal messages. The present server for the shared virtual reality is based on a Sun UltraSparc, which grants simultaneous access to up to 300 users (Figure 5).
3.3. Videoconference

During the analysis phase instruments for asynchronous communications have been largely used to allow the different members of the group not only to share information, but also to communicate directly, to exchange impressions and also to understand which “atmosphere” surrounds some problems. Besides an extended use of electronic mail, videoconference has been applied, especially in important moments, to verify a stage of the design or to take a decision.

The integration of videoconference with the digital whiteboard allows all the participants in the meeting not only to talk and see each others, but also to share a drawing or a picture and on these to sketch in real time (Figure 6).
4. Reflections on the on-going work

At the present stage of our work what seems most interesting to us to underline is the possibility of building relationships among things, in this case documents and information, and among people which computers and networks permit at a national and international level.

The relative ease of use of these tools allows, in fact, in the first place a close collaboration among people directly involved in the design experience: e-mail and videoconference permit in the initial phase effective teamwork, significantly reducing time-spans and offering a considerable exchange of information among groups physically distant from each other.

Another form of collaboration on the other hand is developed in a second phase. Through Internet it has been possible to obtain, again in an international contest and from distant collaborators, a useful exchange of skills.

We have been able to verify that this particular form of communication, which exploits the network speed is definitely useful, not only in a didactic environment but also in professional practice. Besides, the Web site we created represents a remarkable archive of information that can be consulted outside our group, also by other kinds of user: citizens interested in changing their own city, public administration and practitioners. In fact, it is a very flexible instrument, which permits different levels of approach according to specific skills and interests. We think one of the most significant results of our experience is the possibility of applying research in information and communication technology to architectural design, bringing together the worlds of research, education and practice.

References

The address of the main page of the Web concerning the virtual studio on Porta Susa is: http://www.comune.torino.it/~spina2
http://info.tuwien.ac.at/ecaade/proc/lvi_i&ii/gotta.html