CONSTRUCTING AND RECONSTRUCTING THE CITY: THE GLASGOW EXPERIENCE

MAVER, T W
University of Strathclyde, Department of Architecture
and Building Science
t.w.maver@strath.ac.uk

Abstract

This paper describes and illustrates three very different uses of Information and Computing Technology (ICT) to represent, interpret and provide access to the city of Glasgow, Scotland's largest city.

The first application is a web-based three dimensional model of the city centre comprising the topography of the landform, the road and river networks and around 10,000 individual buildings. The model provides the interface to a number of different databases and search engines help the user explor the city.

The second application is a recently completed CD-ROM illustrating, from an aerial perspective, the growth of the city from pre-historic times to the present. It comprises 230 images, 140,000 words of text, 5 video clips and 35 sound clips.

The third application is to create a web-based massive archive of images (around 10,000) and historical events, personalities, objects and themes that can be updated and enlarged inexpensively and made available on-line to the widest possible audience.

Resumo

Este trabalho descreve e ilustra três usos bastante diferentes do uso daTecnologia da Informação Computacional (TIC): para a „representação‰,interpretação e disponibilização do acesso à cidade de Glasgow, a maiorcidade da Escócia.A primeira aplicação é um modelo tridimensional do centro da cidade,disponível na Internet, apresentando a topografia do entorno, as vias, arede hidrográfica e cerca de 10.000 edifícios. O modelo apresenta umainterface para inúmeros bancos de dados e instrumentos de busca auxiliam ousuário a explorar a cidade.A segunda aplicação é um CD-ROM, recentemente concluído, ilustrando ocrescimento da cidade desde a era pré-histórica até o presente, a partir deuma perspectiva aérea. Ele é constituído de 230 imagens, 140.000 palavras emdiversos textos, 5 trechos de vídeo e 35 trechos de áudio.A terceira aplicação é a criação de um enorme arquivo on-line, com cerca de15.000 imagens e eventos históricos, personalidades, objetos e temas quepodem ser atualizados e ampliados facilmente e disponibilizados, através da Internet, para a maior audiência possível.

Introduction

A survey conducted in 2000 by the CASA research unit in the Bartlett School of Architecture at Univerity College London identified 60 city web addresses in around 30 countries (Batty, 2001). From the 60, CASA selected 8 city sites to study in more detail, viz: Tokyo, Helsinki, New Yourk, Philadelphia, Berlin, Washington, Jerusalem and Glasgow.

Glasgow also features in a recent paper from the University of Sheffield (Peng, 2002), in which the approaches adopted in the modeling of Glasgow are compared with the approaches to the modeling in:

Bath
http://www.bath.ac.uk/Centres/CASA/completed/index.html,
Dublin:
http://www.dmc.dit.ie/guests/eirenet/pages/vrdublin.htm,
Philadelphia:
http://www.bentley.com/modelcity/ModelCityPhiladelphia,
Los Angeles:
http://www.ust.ucla.edu/ustweb/projects.html

What emerges from these publications is that, while the various web-based models deploy similar ranges of tools – HTML, VRML, CAD, GIS textual mapping, layers, QTVR, photographs, etc - the way the tools are deployed and linked results in products which vary greatly in their quality, functionality and usefulness.

The range of purposes to which models of cities could be put is very large – from tourism promotion, through urban design and planning, to line-of-sight analyses by the telecommunications industry. What is clear is that one modelling approach is unlikely to meet all requirements. It is for this reason that the ABACUS group in the Department of Architecture and Building Science at the University of Strathclyde in Glasgow has been involved in three relatively disparate projects, each seeking to fulfill a different purpose.

Web-Based 3-D Model

ABACUS (Architecture and Building Aids Computer Units Strathclyde) is a research group based in the Department of Architecture and Building Science at the University of Strathclyde in Glasgow. In the 1980s, using their own software, the team built a virtual model of the city of Glasgow representing an area of some 25 square kilometers, and attempted to produce interactive real-time 'fly-throughs' using the massive urban geometry data-set. Backed with funding from 'Glasgow Action', a team of students was employed over the summer period to help with the mammoth task of capturing the necessary data. The students digitized the 2-dimensional plan of the city then captured the average height of each building by viewing, stereoscopically, pairs of aerial photographs provided by the City Council. The resulting 3-D database was "draped" over a 3-D model of the topography of the city.

Urbanismo. Modelos Ambientales y Sistemas de Información Geográficos

SIGRADI

The 1980's Model of Glasgow – little more than a massive 3-D map – lay fallow until:

the emergence of the world-wide-web and VRML.

the honour bestowed on Glasgow as UK City of Architecture in 1999.

The City of Architecture award opened up funding for the establishment of The Lighthouse (http://www.thelighthouse.co.uk), the most ambitious architectural centre in Europe, housed in a wonderfully refurbished building by Charles Rennie Mackintosh, and for the development of its electronic content. ABACUS was commissioned to provide a wide range of IT applications, from digital jigsaws to interactive guides to the building itself. Most importantly The Lighthouse invested in the development of an interactive web-based model of the city based upon the pioneering work of ABACUS. Fortuitously, the 3-D geometric granularity of the 1980's model of Glasgow – the topography, the road networks and the 10,000 buildings – was just right to allow downloading of some 28 neighbouring city "chunks" which could then be interactively explored on the internet. (http://www.vrglasgow.co.uk)

VR Glasgow allows visitors, individually or together, to explore the city virtually in much the same way that they would in reality. It achieves this by linking to a number of information sources, accessible through conventional Internet techniques such as lists, tables and search engines, as well as indirectly through the VRML. Unlike many Internet systems, there is no pre-set route to follow, or list of useful links. Information is accessed through intuitive exploration of the site, and therefore varies depending on both the user, and the chosen route. In this manner, the user becomes familiar with the virtual city, in much the same way as they would become familiar with the physical city. He or she may identify particular areas of interest, which can be revisited using familiar routes, or accessed via browsing. Figure 1 shows a typical frame from vrglasgow and Figure 2 shows the multi-user inferface.

Fig 1 - Typical interactive frame from vrglasgow.

Current information sources include:
- Multimedia database of General Tourist Information.
- Multimedia database of Glasgow Architecture.
- Alphanumeric database of property addresses and street names.
- External Web-sites.

Historic Document on CD-ROM

The central issue in the design of the CD-ROM – named "Glasgow 2000 : the Story of the City" – was to give a distinctive sense of "place" and to link all of the information regarding the city's history

Fig 2 - Multi-user interface to vrglasgow

to specific geographical locations. An artist was commissioned to produce a series of water-colour aerial perspective views of the Clyde Valley, all from the same eye-point, onto which the evolving village/town/city form could be superimposed. The artist was provided with a computer-generated 3-D wireline topographical model of the area as seen from the chosen view-point and with a series of early maps of the city; his task was then to interpret how the city would have looked from above as it grew and developed. For the most recent period of the city's development, actual aerial photographs were "draped" over the computer generated topography. By manipulating a cross-wire cursor, it is possible for the user, in a close-up window, to visit the sites of significance – from the early battles or archaeological sites of yesteryear to today's football stadia.

The highest level menu relates to the historical periods in the city's development. The menu items are:

Prehistory	(8000BC – 500AD)
Christian	(500 – 1560)
Reformation	(1560 – 1707)
Commerce	(1707 – 1830)
Manufacturing	(1830 – 1920)
Social Revolution	(1920 – 2000)

Within each of these time periods, the user can investigate issues of interest specified by choices from one or other of two menus:

Landscape. The menu items are different depending on the historical period. For example, in the pre-history period the items are: ancient sites, canoes, incidents, fords, Romans. For the manufacturing period the items are: country mansions, city views, distilleries, docks, engine works, landmarks, potteries, public parks, railway stations, shipyards.

Concepts. The menu items are broadly similar for most historical periods and include items such as: people, land owners, the Clyde, government, wealth, work, taxes, technical advances, housing/building, food/agriculture, beliefs, services, communication, education and social/cultural life.

Figure 3 illustrates the home page of the CD and in Figure 4, the six railway stations are highlighted on a stunning 1861 engraving of the city. Note the huge number of sailing and steam ships on the river.

Work on the development of the CD-ROM is now complete. 2500 copies have been produced and will be distributed to schools and academic institutions. It is anticipated that it will become the focus

of much teaching material and a stimulus for further research into the history of the city. It would please the authors of the CD and this paper if the existence of Glasgow 2000 promoted comparisons between the evolution of the European City of Glasgow and the great cities of Iberio-America.
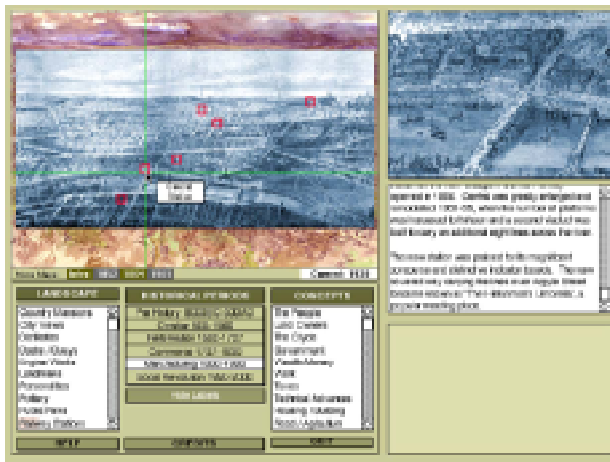

Fig 3 - The home page of the Glasgow 2000 CD-ROM

Fig 4 - A frame from Glasgow 2000 featuring an 1861 engraving of the city (with the railway stations highlighted).

Web-Based Archive of the City

The third major project (TheGlasgowStory), currently in progress, has around US$ 1 million funding from the Uk Government's New Opportunities Fund, set up to secure the digital recording of the nation's heritage assets.

Glasgow's museums, libraries, art galleries and archives hold rich collections relating to the history of the city. Easy access to many of these collections has been restricted due to concerns about security and conservation, and to the limitations of cataloguing systems that have not yet been modernised and made machine readable. The objective of TheGlasgowStory is to unlock these resources for the benefit of all those interested in the history and development of the city from whatever perspective. TheGlasgowStory is uniquely a consortium of the curators of all these resources together with the Universities of Glasgow and Strathclyde.

The use of databases and internet software will make it possible to assemble a digital archive of images and historical events,

personalities, objects and themes, that can be updated and enlarged inexpensively and made available to a wide audience on-line. Providing robust metadata is created, the contents of this archive can be extracted in multiple ways, in order to meet the needs of different groups of users; for those seeking historical information and images for academic study; for local or family history projects; or simply out of a general curiosity about aspects of the past.

Although the access benefits of digital representations of material are widely acknowledged, many websites fail to satisfy as they are poorly constructed. TheGlasgowStory will seek to avoid this shortcoming by adopting a "publisher's model" with careful editorial control over the content and structure of the archive. The long-term preservation of digital materials is still in doubt, but TheGlasgowStory will attempt to future proof the contents by using recognised formats (for example, uncompressed TIFF) and ASCII files in structured databases or represented in XML (eXtensible Markup Language) with well-structured supporting metadata.

The entire system, which will comprise around 10,000 images woven into some 300 "stories", will run via a web-based front-end (Figure 5) that will connect to the underlying database system. Although the database will provide the backbone of TheGlasgowStory website, the users will remain unaware of its presence.

Fig 5 - The home page of TheGlasgowStory

Conclusion

The outcomes from the projects described in this paper are, and will be in the future, genuinely useful for a range of purposes, from education to design and planning. A great bonus, in the view of the author, is that producing the digital documents brings academic into a real partnership with the community within which they live and work.

Referencess

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