

1999-05-01

## An Investigation into the use of the Virtual Reality Modelling Language (VRML) as a Means of Distribution Virtual Reality Tourist Information Across the World Wide Web

Hugh McAtamney

*Technological University Dublin, hugh.mcatamney@tudublin.ie*

Ciaran McDonnell

*Technological University Dublin, cmcdonnell@tudublin.ie*

Follow this and additional works at: <https://arrow.tudublin.ie/dmcccon>



Part of the [Other Computer Sciences Commons](#)

---

### Recommended Citation

McAtamney, H. & McDonnell, C. (1999) An investigation into the use of the Virtual Reality Modelling Language (VRML) as a means of distribution Virtual Reality Tourist Information across the World Wide Web. *Hospitality Information Technology Association (HITA) Conference*, Edinburgh, May 21-24.

This Conference Paper is brought to you for free and open access by the Digital Media Centre at ARROW@TU Dublin. It has been accepted for inclusion in Conference papers by an authorized administrator of ARROW@TU Dublin. For more information, please contact [arrow.admin@tudublin.ie](mailto:arrow.admin@tudublin.ie), [aisling.coyne@tudublin.ie](mailto:aisling.coyne@tudublin.ie), [vera.kilshaw@tudublin.ie](mailto:vera.kilshaw@tudublin.ie).

**“An investigation into the use of the Virtual Reality Modelling Language (VRML) as a means of distribution Virtual Reality Tourist Information across the World Wide Web”**

Hugh McAtamney, B.Sc.  
Dublin Institute of technology  
hughmac@indigo.ie

Dr. Ciaran McDonnail , M.Sc.,Ph.D.  
Dublin Institute of Technology  
cmcdonnell@dit.ie

The purpose of the work described below was to investigate the use of the Virtual Reality modelling language as a tool to distribute tourist information across the web. This was done by the creation of a web site containing two Virtual Reality models of tourist interest. These were then evaluated using a number of techniques both online and offline. This paper describes the methods used to create and evaluate these models as well as giving a overview of some of the results obtained.

## **1 Introduction**

It is widely accepted that the Internet and, more particularly, the World Wide Web (WWW), has become an important and powerful means of distributing tourist information. Current access figures for the Web continue to grow at a phenomenal rate world-wide. The Web owes much of its success to the fact that it standardised the distribution of many forms of media across different networks and computer platforms. Never before have tourists had access to such a wealth of accurate and timely information, immediately available. Indeed, travel revenue figures are predicted to become the highest of all electronic commerce (Nua, 1998).

The Web has come a long way from the mundane text-based Web pages of the early 90's to those of today offering the tourist the opportunity to plan and book almost every facet of his holiday online. However, it has also come into criticism for a number of reasons. Most of these are of a technological or content nature:

1. Web sites often don't take advantage of the range of interactive media that the Internet can distribute. This has led to the term "electronic brochure", a description of passive Web sites where tourists are offered little more information on-line than the off-line paper alternative.
2. Technology, particularly network bandwidth and software applications, has not yet evolved to the point where information can be distributed both richly and in a timely enough manner to satisfy the growing demand for on-line information.

## **2 Virtual Reality**

Of all the technologies that could be used to distribute tourist information across the Web, Virtual Reality, or VR, is possibly one of the most exciting. The term "VR" was coined by Ivan Sutherland (Sutherland 1965) back as early as the 1960's, but has been more recently recognised in modern day television, cinema and computer entertainment. VR is best described as a computer generated 3D environment in which users inhabit and interact as they would in reality. Its applications are many. Most common are VR simulations, used by the military and medical profession for training, and by scientists using it to explore molecular structures. (Norman, 1980) (Mason, 1996) (Iovine 1994)

There are two main views about VR and Tourism. First, it is seen by some to be a threat to normal Tourism by providing an alternative form of Tourism. An example of this is Disney Land (Cheong 1995). But it is the second and, now, most common form of VR, called *Desktop VR* that is now seen as the next form of tourist information. Its success

has been attributed to the massive increase in desktop computer sales and the advancement of various computer multimedia technologies.

Unlike other forms of expensive, hardware dependent VR systems, which engage the user in a total sensory experience using bodysuits, gloves, head-mounted displays and tactile receptors, desktop VR currently only engages the user in two senses, sight and sound (Isdale 1993). Some also argue that it is not technically a full VR or 3D system but more a “2.5D” system (Monnet 1995).

However, there is no doubting the potential of this new medium. In his work on desktop VR and its application to Tourism, Horan recognised the potential of desktop VR to enhance the users' understanding of a particular destination. Using a popular heritage site in Ireland as a model, results indicated that not only was desktop VR a powerful interactive and realistic medium for displaying tourist information, but also that tourists were willing to use it (Horan 1998).

The Internet potentially provided a means to make this possible: i.e. to conveniently distribute VR models to Tourists in their homes. It was the primary goal of this research to investigate whether VR could be distributed across the Internet. *Inter alia*, issues addressed included how would low bandwidth affect the realism, speed and interactivity of VR environments and, most importantly, would people actually use it as a form of tourist information?

### **3 The development of a distributed VR information System - Eirenet**

To achieve these goals a set of set of objectives were made:

1. Look at various methods of VR creation and select appropriate methods.
2. Create VR models of Tourism importance
3. Integrate them into a Web Site
4. Look at effective ways of promoting and distributing them in order to get visitors to view them.
5. Evaluate the models

#### **3.1 VR Creation**

The Virtual Reality Modeling Language (VRML) is the Internet Standard for communicating 3D information across the World Wide Web (WWW) so therefore it was felt that this format would be the most appropriate format in which to design the VR

models. During the early stages of the research, VRML only allowed the design and building of 3D environments. No object behaviours could be included so an object could not be made, for example, to open and turn. However upon the release of the VRML 2.0 standard, behaviours and functionality could be programmed into environments.

There were essentially three methods of VRML creation

1. Model translation from other formats (such as DXF from Autocad or 3D Studio)
2. VRML exporters (translate any given format into VRML).
3. VRML environment modelling systems.
4. Creation by hand using a text editor.

VRML is similar to HTML in that it is parsed or read line by line by the browser. To view VRML models within a browser, the user needs a specific plug-in which is accessed by the Web browser MIME type interface (SGI 1998, Intervista 1998). These plugins are distributed freely and in later Web browser versions come as part of the browser package.

It was found that at the early stage of development no one method of creation was better than the other and that a combination of methods would need to be used.

### **3.2 Creation of VRML Tourism models.**

Two models were created:

1. The O'Connell St model was the prototype model. This street in Dublin's city centre is the most visited street in the country and has played a very important part in Ireland's history. It is also the city's main shopping area and hosts many hotels. It was felt that this model could be used to both provide historical information on objects such as statues and buildings and functional information on the whereabouts of banks and hotels. It was also used to test various interactive VRML constructs.

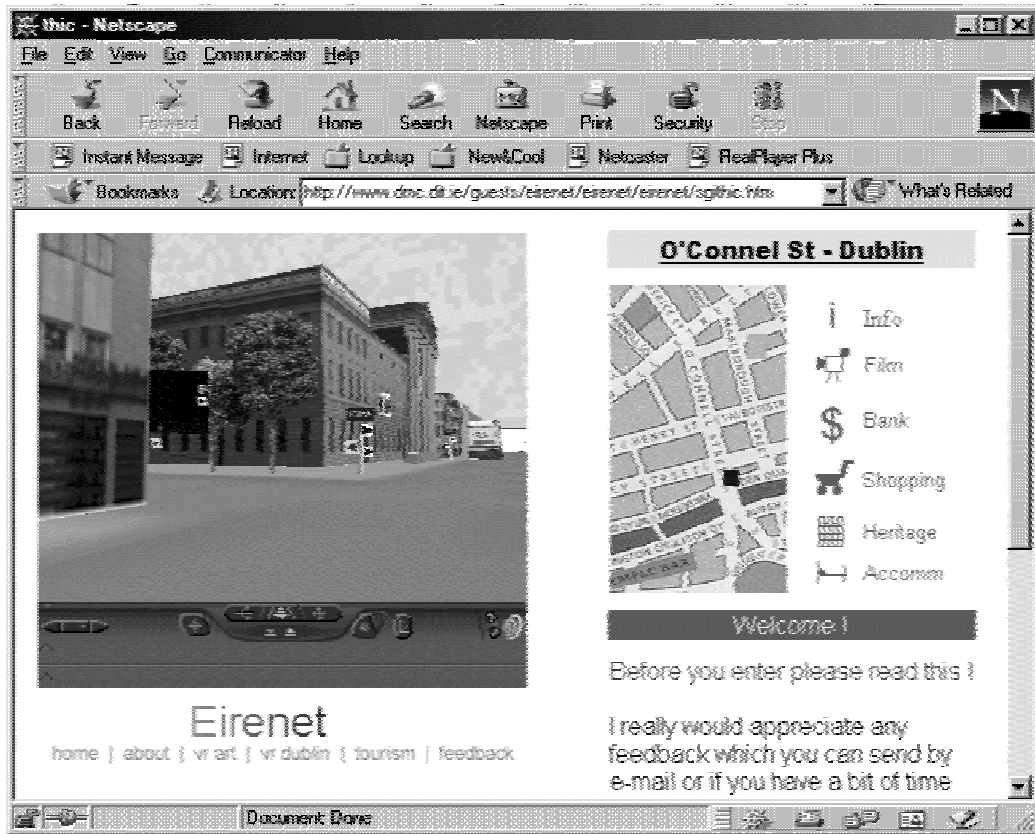


Fig. 1. – The GPO on O’Connell St as seen in the Cosmo Player and Netscape Navigator

The Interface for this model consisted of a VRML window in the left frame and HTML text in another frame on the right (*see Fig. 1*). Visitors could take a guided tour inside the VRML window and access information by clicking on various objects in the environment. This information would then be displayed in the right frame. Alternatively, visitors could access more specific information on the right and then walk using the VRML interface to the place indicated on the map.

2. The National Gallery of Ireland is Ireland’s most popular tourist attraction (Irish Tourism Board, *Bord Failte* 1998) and being a mainly visual experience, lends itself readily to this type of VR. This model, which consisted of the Milltown Wing of the Gallery and which was created at a later stage in the research, was also used to see how well VRML integrated with other Internet technologies such as Progressive Network’s *Real Audio* player (Progressive Networks 1997)



Fig. 2 – The National Gallery of Ireland

The interface for the National Gallery Model, which consisted of followed a similar layout with VRML on the left and HTML on the right. Visitors could either “walk” around as they wished or take a guided tour. This guided tour option linked with a *Real Audio* plug-in where visitors could listen to a tour guide talk in more detail about a particular painting. (Progressive Networks, 1997)

### 3.3 Creating the Web Site

The Web site containing the models was called Eirenet (Eirenet 1998). It offered visitors information about the design of the models, what was needed to view them, how long it would take to download on a standard 28K modem and where they could submit feedback..

### 3.4 Site Promotion

While some sites regard a high hit rate as being a success, others regard the purchase of a product as being a sign of success. To achieve success in the case of this research it was important to obtain the right feedback from the right visitors. To do this, it was the aim to attract the right visitors (in this case, potential tourists), to get them to visit the site, view the models and to give feedback via email or questionnaire.

There are many motivations for people to use the Web (Buchanan, 1997). In the case of this research, it was decided that those visitors to the Eirenet site motivated by a desire for tourist information were assumed to be the most valuable visitors. While it can also be said that every visitor is a potential tourist, it is important to outline the levels of importance attached to each of the types of visitors to the site. (See *Table. 1*)

Gauging the success of these strategies was carried out by site impact measurement techniques (See *Fig. 2.*) and by a promotion strategy flowchart. The aim was to evaluate the success of the promotion strategies and the content mix (i.e. the structure and layout of content). This was done by providing hard data in the form of raw measures (site usage statistics) and by allowing the user to take advantage of site specific features such as questionnaires and emails to send their own opinion of the site.

Visitor type	Strategy	Expected Short term response	Expected Continuity of response	Value of response
<b>(A) Problem Driven</b>	1. Submit Site to Search engines	Low	Low	Low/medium
<b>(B) Traditional Curiosity.</b> These users will generally be people interested in VR technology or in Tourism	2. Mailing List and other media submission	High	Low	Medium
	3. Submission to Web sites under the headings of VR , VRML, Tourism	Low	Constant	Medium
<b>(C) Promotion Driven</b>	4. Alliance with Tourism information Web sites	Will vary depending on site traffic and arrangements made - medium	High	High

Table. 1. – Value of response

### 3.5 Evaluation

The Eirenet VRML models were evaluated internally and externally. The internal testing preceded the external testing and was used to ensure that the models performed satisfactorily under a number of conditions before being externally available across the web. The models had to perform satisfactorily at an appropriate framerate, on a low end personal computer, over a variety of web and VRML browser platforms and over a 28.8K



modem for them to be realistically experienced by the majority of web users. Upon achieving these required levels of performance the models were then made externally available on the Web.

The aims of the external evaluation were to help ascertain whether the VRML models and the site as a whole were performing satisfactorily. This was achieved using a number of techniques which can be broken down into 2 types of analysis. Qualitative and Quantitative (*see fig. 3.*)

Quantitative analysis measured the performance of the site in terms of site usage. This helped identify where visitors had come to the Eirenet site from and how they used the site. This information was then incorporated into a site evolution strategy. Log files were taken at regular intervals from the web server hosting Eirenet and fed into a database. A number of queries were then used to identify unique visitors and where they had come from. These were then correlated with other queries that listed the pages visited and VRML worlds downloaded. By analysis time statistics it was possible to identify the paths taken by visitors to the site.

This analysis played an important role in identifying problems with the site and with sampling an online audience in general. In particular it indicated that the Gallery models were not being visited as much as the O'Connell St model. As a result it became necessary to employ other methods of evaluation, for example, a computer was set up in the lobby of a city centre hotel and tourists were asked to sit down and view the models. This meant that it became possible to retrieve sufficient feedback concerning the Gallery model.

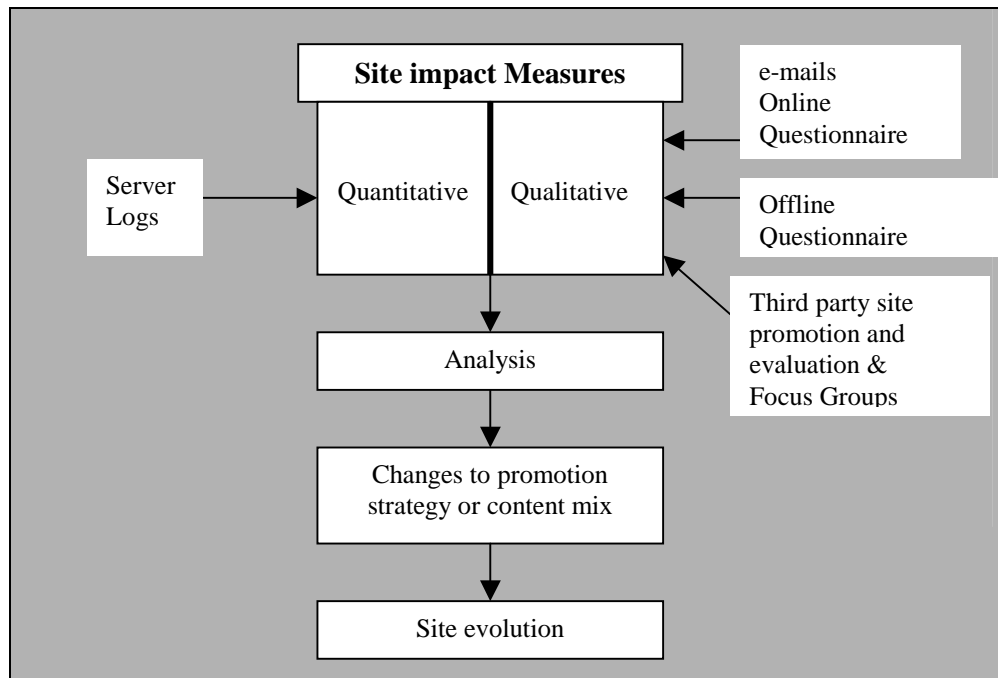


Fig. 3. – External evaluation

Qualitative analysis methods included Online Questionnaires, sampling tourists in a hotel lobby and focus groups. The questionnaire helped gather information regarding the opinions of visitors and experts as to the performance of the VRML models in terms of realism, range and level of interactions, bandwidth performance and most importantly as a medium from visualising tourist information. The questionnaire also helped gather information about visitor's connection speeds, computer hardware and software used.

#### 4 Overview of Results

By the second month on the Web, the Eirenet Web site was receiving over 500 unique hits a day. However many of these visitors fell into the category B visitor (those interested mainly in VR rather than Tourism). Other methods had to be used to reach those classified as tourists. This included setting a computer up in the lobby of a hotel and asking questions of tourists who had just finished using it.

It was important that the models could be viewed across the widest spectrum of VRML plug-ins or viewers. Both models work satisfactorily across the most common platforms. As expected, most visitors to the site were using Pentium PC's running Netscape Navigator and Cosmo Player 2. During internal testing, this platform was found to perform best.

Approximately 70% of site visitors did not view either of the VRML models (they looked at the associated multimedia). This could be attributed to a number of reasons:

(1) **Visitors did not have appropriate viewing software** – however, analysis showed that almost all of those **not** viewing the models took no steps to download the appropriate software.

(2) **Visitors did not wish to spend time downloading the models** - Each model totalled less than 150K (including sound, images and geometry) and took approximately 2 minutes to download under normal Web conditions. Results from the questionnaires showed that although download time is an important issue, in the case of this research it did not effect visitors' enjoyment of the models for those that did view the models.

It was also necessary to redirect site traffic to the National Gallery model, which had significantly fewer visitors then the O'Connell St Model.

It was found that the majority of respondents (i.e. those who submitted feedback from the site) were actually those looking for tourist information. As a result sufficient valuable feedback was retrieved.

Based on the analysis of both the quantitative and qualitative results it was clear that VRML could be used to aid a tourist in understanding more about a tourist destination. Almost all respondents responded positively towards using VR as a type of tourist information system. Many indicated that the time taken to download and ease of use would be their main concerns. Surprisingly, the realism of the models was not an important issue as most respondents felt that the models gave them a good enough impression to be able to understand more. Furthermore most respondents also said that they would be willing to use this type of system again.

## **5 Further work**

As a result of this research the National Gallery of Ireland has commissioned the rest of the Gallery to be designed and built in VRML. These models will be linked to a database of information about each of the paintings, including those not normally on view. This will allow visitors to view paintings that have never been on show as, typically, the Gallery can show only about 800 of its 10,000 items. VR development tools have progressed since this work began and the newer model of the Gallery is even more realistic than the original model of the Milltown Wing.

## **Bibliography**

- Bord Failte (1997)**, “Tourism’s role in economic growth”. Bord Failte, Dublin
- Buchanen, R (1997)**, “ Measuring the impact of your web site”, Wiley and Sons, New York
- Cheong ,R (1995)**, “The Virtual Threat to Travel and Tourism”, Tourism management, Vol 1, 1995
- Eirenet (1998)**, <http://www.dmc.dit.ie/guests/eirenet/eirenet/pages/vr.htm>
- Horan, P (1998)**, “The World is What you make it, An application of Virtual Reality to the Tourism Industry”, Dublin Institute of Technology, Dublin
- Intervista (1997)**, <http://www.platinum.com/>
- Iovine, J (1994)**, “Step into VR” , Windcrest
- Isdale, E (1993)**, “What is Virtual Reality”, Wiley & sons, New York
- Mason, C A (1996)**, “Desktop Virtual Reality in the RAF”, Colloquium on human computer interaction digest
- Monnet, J (1995)**, “Virtual Reality the technology and its applications”, Wiley & Sons, New york
- Norman,D (1980)**, “The design of every day things”, Doubled press
- Nua (1998)**, <http://www.nua.ie>
- Progressive networks (1998)**, <http://www.real.com>
- Silicon Graphics (SGI) (1998)**, <http://www.cosmosoftware.com>
- Sutherland, I (1965)**, “The ultimate Display”, Proceedings of the IFIPS congress, Vol 2,

Authors:

**Hugh McAtamney** is a Researcher in the Digital Media Centre in the DIT. He has a background in hospitality and has a B.Sc in Management from Trinity College Dublin and a Higher Diploma in Hotel and Catering Management from the Dublin Institute of Technology. He is completing an M.Phil in applications of Virtual Reality in Tourism and is also involved in work in Communications Technologies in Distance Education.

**Ciaran McDonnell** is Head of Research and Development in the Digital Media Centre, a Research Centre within the Dublin Institute of Technology (DIT). He has worked professionally for over 25 years with Computers, with experience in Industry, Education and Research. He graduated from University College Dublin in 1972 with a degree in Science and subsequently earned both an M.Sc. and a Ph.D. in Computer Science from Trinity College, Dublin. Prior to his present position, he was Head of Computing in one of the constituent Colleges of the DIT and is involved in researching the applications of IT in Tourism and in Education, with specific emphasis on uses of Virtual Reality. Other active research interests relate to the use of Communications Technologies in Distance Education.