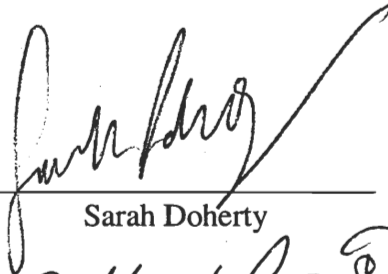


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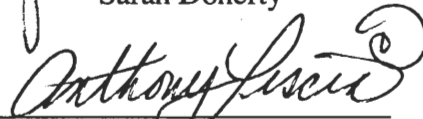
WPI- NUFFIELD CURRICULUM CENTRE: LONDON
CITY OF SCIENCE WEB SITE DEVELOPMENT

An Interactive Qualifying Project Report
Submitted to the faculty of the
WORCESTER POLYTECHNIC INSTITUTE

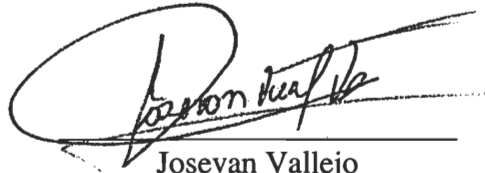
In partial fulfilment of the requirements for the
Degree of Bachelor of Science
by:



Sarah Doherty



Anthony Tiscia



Josevan Vallejo



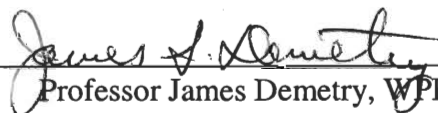
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Date 1 May 2003

Approved:



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Professor James Demetry, WPI Advisor

Abstract

The Nuffield Curriculum Centre's Cities of Science Web site is a portal to scientific activity in the City of London. This project involved creating new and exciting content in the areas of science, technology, and engineering in order to expand the content of the Web site. The team submitted a total of 44 entries to the Web site, and saw user traffic increase by 70% during the course of the project.

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Executive Summary

The Nuffield Curriculum Centre's main objective is the development of curricula for primary and secondary aged students in the United Kingdom. The Cities of Science Web site was created by the Curriculum Centre to bring science to the population in general. The site uses the multimedia outlet of the Internet to highlight the scientific side of the City of London. The site was built to encourage active user participation in the creation of new content. Unfortunately, the Cities of Science Web site suffered from low traffic volume and minimal user participation.

The project team developed three primary objectives that would help the Nuffield Curriculum Centre address the problems of the Web site. The first objective was to boost the content of the Web site by having team members research and write articles for the site. This would involve generating content and contributing to the development of the Web site. The second objective of the team was to make the content sustainable. By working to make the content sustainable, the team tried to ensure that the content growth would continue after the end of the project. The third objective of the team was to evaluate the impact of the new content on the traffic of the Cities of Science Web site.

In order to achieve these objectives, the team visited several scientific places of interest and interviewed leading London-based scientists. The visits to places of scientific interest were a quick way to begin generating content for the Web site. Places to visit came by suggestions of the project sponsor, periodicals, and searches on the Internet; articles were written in a three step process: preliminary research, interactive research, and production. In the preliminary phase, the team researched places with a scientific link that we believed would create interesting content. In the interactive phase, members of the team visited the sites to photograph and document the places. Finally, in the production phase, team members composed the articles and submitted them to the editors for approval.

On-site visits by team members proved to be the quickest way to generate content for the Cities of Science Web site, but visits did not address the sustainability issue of the Web site. Two methods were used to establish sustainable content on the Web site. Towards the beginning of the project, the team researched events programmes of places they visited. The

events programmes could be used by the editors of the Cities of Science Web site to create new entries on upcoming events past the end of the project. Later in the project, the team began contacting scientists, who were doing their own research, in order to elicit outside submissions. These two methods will help promote the generation of content beyond the end of the project.

At the end of the project, the team generated 44 entries, which increased the total number of articles of the Cities of Science Web site by 38.9%. The traffic to the Cities of Science Web site increased by 70.4% between 7-March-2003 and 26-April-2003. These results show a correlation between the increase of traffic and the increase in the number of articles. These figures, however, do not indicate that the new content was the sole reason for the increase in traffic to the Web site, nor can they accurately describe the effect of the content, due to the short time frame of the project and the fact that new content was being developed throughout the duration of the project.

1.0 Introduction

Science and technology form the foundation of modern life; however, most people have not fully appreciated what science contributes to their lives and have not been interested in science. Ironically, studies have shown that although the public feels it is necessary to study and understand science, many also feel that science is too complex for non-scientific people to understand. This problem has been caused partially by the gap between scientists and the public. Scientists generally have not published their work in a manner that the public can understand and, because of that a larger percentage of the public are intimidated by science. Raising the scientific awareness and understanding of the general public is an important societal goal that is global in scope.

One method of reaching many people globally is through the Internet. The Internet is a tool that can be used to reach people across political, social, and economic borders. It can be used to present unique views and ideas to the rest of the world. There is irony in the fact that the Internet was once a tool that allowed geographically distant scientists to communicate and promote their research yet now is a virtual void of scientific information in comparison. The use of the Internet has magnified since technology has improved, and encompasses a broader and more public audience now that it is accessible to anyone with a phone line and a computer. There are many Web sites sponsored by science foundations and institutions which have used the Internet to publicize their scientific ideas and technological information; however, the general public has generally ignored most science-related Web sites. Partially, the problem has been that most science Web sites are aimed at scientists and researchers, and not the general public. The online community has been one resource in promoting science to the public. Ongoing efforts to make science more accessible to the general public include the Nuffield Curriculum Centre and the Cities of Science Web site.

The Nuffield Foundation has the resources and materials to reach a vast number of people. Organised into five areas of special interest; funding is allotted to each area from the Foundation's income. As an area of special interest; the Curriculum Centre supplies funding in forms of grants to programmes which "focus on curriculum development for science, maths, [and] technology . . . (Nuffield)" Since the Curriculum Centre "Leads and co-ordinates a range of school-based curriculum development projects and associated activities both within the Centre and in partnership with other institutions (Nuffield)," it was decided to

use Curriculum Centre funding to set up a Web site to stimulate public interest in science. The Cities of Science Web site was organised to show the public what science does for cities in England and what these cities do for science.

The first city the Web site focused on was London, which is the city that was designated to the project team. The outline of the Web site has an interesting and critical feature which allows anyone to post an entry; this was designed to keep the content sustainable. However the amount of traffic going through the Cities of Science Web site initially was disappointing, which made the amount of articles submitted by out of house sources lower than expected. Additionally, they had found that people outside of the Nuffield Foundation were reluctant to contribute to the content of the site. The Web site attempted to address the problem of public apathy towards science. However in attempting to address this problem there are certain goals which needed to be fulfilled in order to stimulate and reach a broad audience. While the site made good progress in addressing the problem and getting the public interested in science, the Curriculum Centre felt that more content would help in furthering their goals.

The Nuffield Foundation enlisted this group primarily to generate new and exciting content for their Cities of Science Web site. At the start of the project the Web site featured photographs and information from approximately 80 places of scientific interest in London; however, the “Events” and “Where Science is Done” sections had yet to be developed to the desires of the Nuffield foundation. Most of the submissions on the site were written by the director of the Nuffield Curriculum Centre, Andrew Hunt, and his personal contacts, and colleagues. The content was to be based on the Curriculum Centre’s broad definition of science to include technology, and engineering within the City of London. The focus of the content needed to combine three elements of science in London: where science is done, events and places, as well elicit interest in the site through visually pleasing formats and imagery.

In addition to generating new content, the team had a secondary goal of establishing contact with scientists and researchers in and around London in an attempt to make the content of the Cities of Science Web site sustainable. It was the intention of the Curriculum Centre to have a large proportion of entries generated by outside sources. Logically, scientists and researchers would have been the best at representing science in new web entries. This goal

was based on the idea that if the scientists and researchers could bring their work and experience to the public, the public would have an increased interest and a better understanding of science.

The main focus for the project team was in these areas. Using well-documented methods and protocols, the team was able to craft new and exciting content for the Nuffield Foundation. By reviewing scientific events and activities, documenting the deep research history of London, and interviewing prominent scientific figures the team published a total of 44 articles distributed into the following categories: 8 events, 10 where science is done, and 26 places. As well as distributing leaflets promoting the Web site to any organisation we contacted in order to encourage external submissions, the project team interviewed scientists, engineers, and planners to solicit a total of 4 external submissions. One result that was tracked throughout the entirety of the project was the GOOGLE® page rank. The initial page rank under the key words “Science, London” was 67, and concluded at 10 with the number of visitors to the Web site counted at 1,009 during the last week of the project.

The Curriculum Centre has long been a well-established institution of scientific understanding and learning. Through the Cities of Science Web site, the Centre can present science to children and adults of all ages. Although the content has been presented in a straightforward manner, it is content that properly represents the Centre’s reputation for excellence and excites a public that so far has been hesitant in following science.

2.0 Background

The Cities of Science Web site is a project of the Nuffield Curriculum Centre, which is a department of the Nuffield Foundation, a foundation that is interested in the advancement of the sciences in England. Using the grants provided by the Nuffield Foundation, the City of Science Web site was created to present the scientific life of major cities to the public, in order to inform them of the science surrounding them.

2.1 The Nuffield Foundation

Founded in 1943, the Nuffield Foundation was created with a gift from William Morris. Morris was the owner of Morris Motors, Ltd. and gave this gift in the form of £10M-worth of shares in the automobile company. Dedicated to the advancement of science, Morris, later Lord Nuffield, wanted his Foundation to do the same. Today, the Nuffield Foundation continues the tradition and spirit of Lord Nuffield through grants to five specific and one general area, for miscellaneous projects. The recipients of the grants use the funds in a variety of ways, including research, support of innovation, and volunteer organisations. The grants are given to projects that the Nuffield Foundation feels will accomplish goals that effect the population as a whole, rather than a smaller subpopulation with a highly specific or localised problem. In addition to grants in order to outsource projects, the Nuffield Foundation provides funds for in-house projects. The Nuffield Curriculum Centre is one of these in-house projects.

2.2 The Nuffield Curriculum Centre

Created in order to develop quality content for primary and secondary students of the United Kingdom, the Nuffield Curriculum Centre has the task of “explor[ing] new approaches to teaching and learning by developing, managing and supporting curriculum projects” (Nuffield). The topics that the NCC covers are in line with that of the National Curriculum, and include: science, design and technology, history, and mathematics. Places like the NCC exist because of the education system in the United Kingdom. Teachers of subjects are required to cover a strict list of topics within their subject, with any extra time being able to be used at their discretion. Therefore, the NCC designs curriculum for schools to use in these core subjects, and competes with other organisations with similar intent.

Part of exploring new approaches was the idea of a Web site that featured scientific activity in major cities around the United Kingdom. London, the capital, was the first choice because it is rich with historical science, and teeming with fresh, cutting edge research. This idea gave way to the project's main focus, the Cities of Science Web site.

2.3 The Cities of Science Web site

The project team has been called upon to increase content of the Web site, as well as to make the content sustainable, but in order to do this the team needed to examine the site. As Figure 2.1 illustrates, the Cities of Science Web site is a portal to the cities that it features. Much like other sites for tourism or art, the Cities of Science Web site chooses to focus on the scientific side of the cities it features. Science is defined not only as elementary subjects, such as chemistry and biology, but also technology and engineering work. The concept is that science is an important part of everyday life; therefore it can be celebrated like the more liberal arts. Available to visitors are four categories, but only three are in heavy use: "Where Science is Done," "Events," and "Places." The fourth section, "People" is not in heavy use because scientists prefer to be associated with their research group, rather than be singled out. The idea of presenting historical figures in the People section had been previously discussed but the liaison felt that presenting historical figures is inappropriate for the scope of the Web site. Each of these categories features scientific topics that visitors can explore by clicking on the link to the respective topic.



Figure 2.1 London Cities of Science Home

2.3.1 Where Science is Done

In the Where Science is Done section, the site focuses on the scientific research that is occurring in London today. Figure 2.2 provides an example of previous content found in Where Science is Done on the Web site. This section primarily features institutions that fund scientific research through grants, similar to the Nuffield Foundation, perform scientific study in-house, or actively contribute to science in some other way. In doing so, interested visitors to the Web site may take it upon themselves to visit that specific location to learn more about what that research facility is doing. This section helps to supplement existing curriculum by providing teachers or interested students a place to see their favourite subjects come to life outside the class room.

LONDON

→ search Portal Home → London → Where Science is Done pages

More light from neater lamps
Studying energy and materials at the National Physical Laboratories

Alan Dinsdale works at the National Physical Laboratories, NPL, which is the United Kingdoms national standards laboratory. The laboratories provide important measurement services to government and industry.

Compact but bright
Alan works in the area of thermodynamics dealing with solid, liquid and gas phases. One area of his work is with compact fluorescent lamps. He tries to find what other elements he could add to the mercury to produce the maximum amount of light from the lamp.

His work therefore contributes to society in the development of these efficient lamps, which save money, energy and are good for the environment.

He also works with castings, providing data about how the molten metal sets in the mould of engine castings. (This led us on to an interesting discussion about molten chocolate!)

The pleasures and chores of working with science
Alan enjoys working as a scientist at NPL, as he does something that is unique and contributes to our knowledge. He didn't always want to be a scientist though, at school he fancied playing cricket for England! He went on to study chemistry at university and gained further qualifications whilst at NPL. The aspect of his work that he enjoys the least is having to fill in forms and do all the paper work!

Studying energy and materials at the National Physical Laboratories
Teddington, Middlesex
TW11 0LW

→ Streetmap
→ email this article to a friend
→ print this page
→ what's nearby?

Related Articles
→ From flaming torches to high-pressure sodium lamps

Project sponsors:

 City sponsors:

Figure 2.2 Example of Previous “Where Science is Done Content”

2.3.2 Events

The Events section accomplishes a similar goal of bringing science to life; however, the scope is slightly different. In this section, entries to the site primarily focus on lectures, discussions, and special exhibits at museums. These events are often limited time engagements but animate the research in an effective method. Teachers or interested students can supplement their curriculum by going to these events to view artefacts or scientific objects that are otherwise out of their reach or appear lifelessly in the pages of a textbook. Figure 2.3 is an example of an article on an events programme that a teacher may use to supplement his or her curriculum, for example in botany. The subject of science comes to life at these exhibits just as much as at the places mentioned above, and brings to the

forefront of people’s minds that science is more than words in a textbook, but rather an important part of society.

The screenshot shows a website interface for 'Events at Kew Gardens'. At the top, there is a navigation menu with links: 'home', 'places', 'events', 'where science is done', and 'back to cities of science'. Below the menu is a banner image of a city skyline at night. On the left side, there is a search bar and a photo of a large, modern building. Below the photo, the text reads: 'Science and plants at the Royal Botanic Gardens Kew, Richmond TW9 3AB'. There are also links for 'Streetmap', 'email this article to a friend', 'print this page', and 'what's nearby?'. Below that, a 'Related Articles' section contains a link to 'Advanced scientific research'. The main content area on the right has a breadcrumb trail: 'Portal Home → London → Events pages'. The title is 'Events at Kew Gardens' with a subtitle 'Science and plants at the Royal Botanic Gardens'. The text describes a 'varied programme of festivals, exhibitions, lectures and special features.' and provides contact information: 'Details Ring for further information on 020 8332 5000. Twenty-four-hour recorded information is available on 020 8940 1171.' There is an information icon and a link to 'Find full details of the programme at the Kew Gardens web site.' and a 'See also: Biodiversity Plant science' link. At the bottom of the main content area is a 'Back to top' link. On the right side, there are logos for 'Project sponsors' (nesta and The Nuffield Foundation 1943-2003) and 'City sponsors' (London Region and Nuffield Curriculum Centre).

Figure 2.3 Example of previous Events content

2.3.3 Places

In reminding us that science is an important part of society, people must also remember that it is part of history as well. The Places section of the Web site tries to accomplish this goal. Primarily featuring museums or other places of scientific accomplishment, the Places section of the Web site features museums and other places of science, such as the article found in Figure 2.4. This section tends to be more of a collection of scientific marvels around the City of London, rather than active science research or cutting edge technology. The Places mentioned here often have another branch that science is actively occurring, but Places are often museums, where one can view the science of the past and see how it relates and has changed, and how it may still affect life today.

The screenshot shows the 'Cities of Science London' website. At the top left is a logo with a gear and the text 'CITIES OF SCIENCE LONDON'. A navigation menu includes 'home', 'places', 'events', 'where science is done', and 'back to cities of science'. Below the menu is a night-time image of the London skyline. A search bar is present, followed by a breadcrumb trail: 'Portal Home → London → Places pages'. The main content area is titled 'Presses for printing' and 'Exhibits at the British Library'. It features two images: one of a large 18th-century printing press and another of a Monotype keyboard. Text describes the history of these technologies. On the right, logos for project sponsors 'nesta' and 'The Nuffield Foundation 1942-2003' are shown, along with city sponsors 'London Region'.

Figure 2.4 Example of previous Places content

2.4 Impact of Science and Technology and Public Opinion

Science surrounds a person through the City of London, and many people are dependent upon science and technology to survive in business and in life. In a study conducted by OSTWT, 74% of respondents were interested in medical discoveries and 87% were interested in health issues in general (4.16, p.21). These issues directly affect the lives of the public, but the aim of the Nuffield Foundation is to reinforce the interest of the public in all the topics of science, so that people’s interest in science isn’t merely self-serving, but rather a genuine interest in all aspects of science and engineering.

Scientific curiosity in the human aspect of science is high because it affects individuals directly, but mass media rarely offers any stories that are scientifically related, be it in print, radio, or television. In a panel discussion on the radio programme entitled “Science Friday”, it was noted that “less than a decade ago, almost 100 newspapers devoted a separate section

to reporting science. Today, more than half of those sections are gone, although we live in a time of incredible scientific achievement” (Science Friday, 1997). The lack of articles featuring breaking scientific news alienates the general population from science, and adds to the mystique that shrouds science as later shown in the same OSTWT study. It was found that 68% of respondents strongly agreed that “Science and Technology is too specialized for most people to understand,” while another 38% feels that they were not clever enough to understand science and technology (4.4, p.23). These figures are not reassuring as much of the research that scientists carry out effect the quality of life of those people.

The blame for scientific disinterest cannot be placed solely on the media; some of the negative view of science can be placed on the scientists themselves. A scientist’s willingness to share information with a broader audience varies from scientist to scientist, based on their willingness to let outsiders into their private world. In an interview with Jonathan Barnett, a WPI professor, the team learned that some scientists are willing to tone down their technical jargon in order to reach a less specialized audience, yet maintain professional when speaking with colleagues (Barnett). For example, when presenting his work on the World Trade Centre, Professor Barnett spoke to many different groups of people regarding his work with the tragedies that occurred in September of 2001 because those events captured the attention of an entire nation. He noted that his tone and diction changed with each of the groups that he spoke to, in order to reach the majority of the audience. This leaves us with the need to reach out to scientists by encouraging scientists to share a basic understanding of the science behind their works to those who are affected by them.

The Cities of Science Web site tries to bridge this gap between the two worlds by presenting its content in a manor that can be digested by the general public. The role of the team in this process will be described in Section 3, but in order to create new content we need to examine previous content on the site in order to maintain coherence through out the entries.

2.5 Prior Content and Similar Resources

The team examined previous entries Cities of Science Web site, as well as examining other similar Web sites, in order to compare the Cities of Science Web site with that of other sites competing for the same traffic. Not only did the team get an impression of the Cities of

Science Web site, but also received some insight into the other ways similar content was being presented to the public.

2.5.1 Existing Content on Cities of Science Web site

In working with the NCC to increase content, we want to create entries for the site that were too long or not in the general interest of the project. This will prevent any extra work for the team, or the liaison. The entries on the site generally are around 200 words in length and feature a picture from or of the site that was visited. In addition to the pictures featured, there are external links to other sites that will provide a more in-depth explanation of the topic of the article or provide a schedule for the event that is featured. These links are crucial in generating an interest in the topic because it gives the visitor a highly focused direction to follow for more information on that topic, unlike more traditional forms of media. As discussed in Section 2.3, this incarnation of a portal to the scientific Internet is not the first of its kind, but rather one of many other resources that teachers or interested students have at their disposal for finding scientific activity in the City of London.

2.5.2 Similar Web sites

Other sites that highlight scientific activity are generally part of accredited science societies or unions. Most notable of these types of Web sites are the Royal Institution of Great Britain and the Royal Society. Both Web sites focus on science in the United Kingdom, and provide a great deal of information regarding national science activities; however, they try to appeal to too many audiences. For example, both sites offer information about events that are occurring at their respected organisations but the Royal Society, for example, also provide information about topics that are not curriculum-based, such as membership to the organisation or grants offered by the organisation. Figure 2.5 presents the Cities of Science Web site and the Royal Society Web site side by side. These sites tries to appeal to people not only looking for scientific activity in London, but also people looking for grants, membership, or any other variety of reasons. This differs from the Cities of Science Web site because the focus of the site is primarily towards curriculum supplementation. By remove the clutter offered at other sites, the Cities of Science site is more able to provide visitors curriculum supplementation with less navigation.

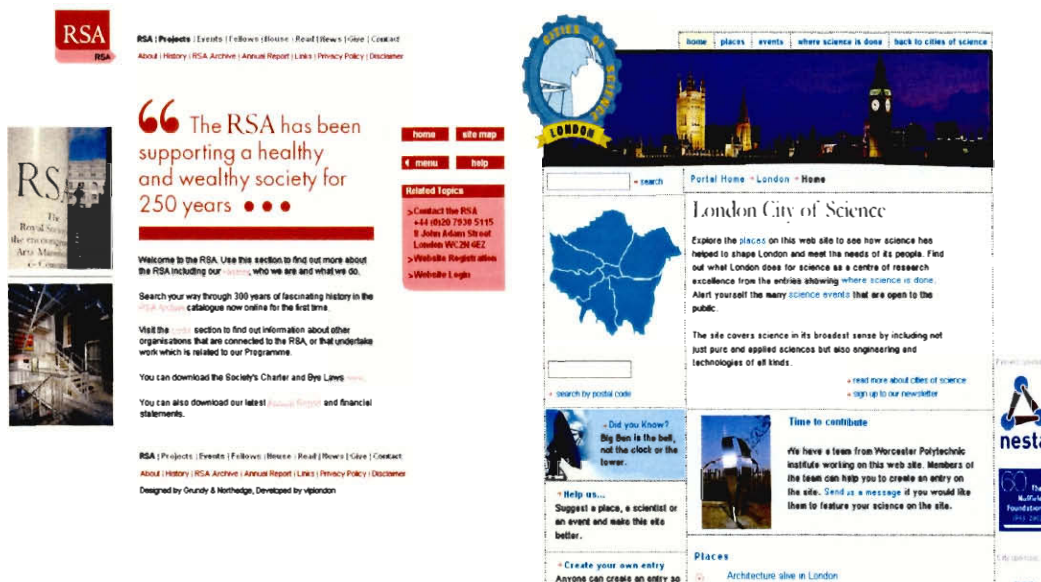


Figure 2.5 The Royal Society Web site and The London Cities of Science Web site

2.5.3 Offline Content and Resources

Other offline resources include a currently out-of-print book and a similarly outdated pamphlet produced by the British Library. The book entitled London Science provides information on many scientific places around the city of London, as well as the pamphlet, however, printed material becomes outdated too quickly to represent the fast moving world of cutting edge science. Also, printed materials offer little opportunity for immediate follow up to questions that the users of these items may have, and thus reducing the chance that the user will pursue their interest in the subject matter. This is where the benefit of having an online portal is important to stimulating scientific interest. By providing links to more information on that topic, the Cities of Science Web site accomplishes its primary goal of introducing science to students and teachers. Keeping the interest of the visitor will be important in the success of this Web site, and our team has the opportunity to capture the attention and interest of its visitors by generating new and exciting content for the site, focussing more on the living aspects of science over the course of the project and establishing contacts with scientists to create a way to sustain that content after the team has left.

3.0 Methodology

The team's objective at the Nuffield Curriculum Centre is to increase the content found in the Cities of Science Web site, and as a result to increase the traffic to the Web site. The production of the individual articles occurred in three main parts: preliminary research, interactive research, and production. After content was introduced as an active part of the Web site, the task of the team then became to analyse the effect of the content to the overall traffic of the site. The Nuffield Centre finds traffic important because it extends their capabilities to present new scientific curriculum to the public.

3.1 Article Production and Publication

During the Article Production and Publication phase of the project, the team focuses on generating content for each of the three sections of the Cities of Science Web site. It was determined that generating content would result in an increase in traffic because the site would cover more topics, which would increase the chances of a visitor finding something that piques their interest. The production process occurred in three steps, preliminary research, interactive research, and production.

3.1.1 Preliminary Research

In the preliminary research, the team was responsible for selecting a topic to write about using prescribed criteria, researching the topic, and arranging for interviews or tours for the interactive section of the process. The process of selecting topics occurs in two parts, shown in Figure 3.1. In order to generate content for the Cities of Science Web site, the team first had to select potential topics that were suitable for the Web site. The team arrived at potential topics through a three different means: suggestions from the liaisons and advisors, printed material, and Internet searches.

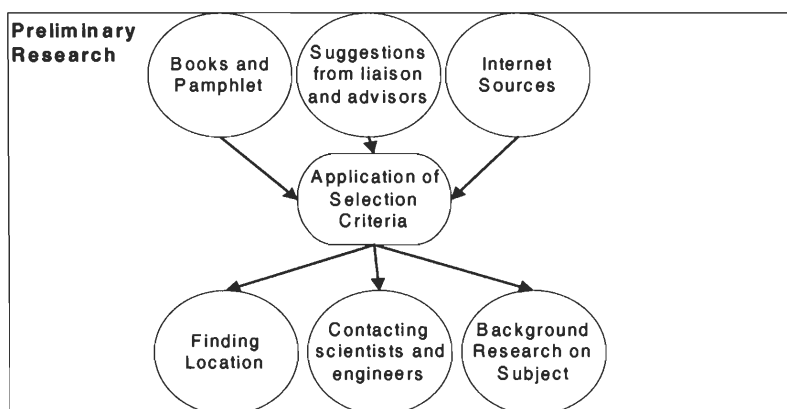


Figure 3.1 Preliminary Research Diagram

After a potential topic is selected, the criteria are applied, and if selected more research on the topic is performed, arriving at the final project of the background research.

3.1.1.1 Printed Material

Having an interest in a topic and a desire to report on it is not enough for an engaging article on that topic. After the first meeting with the liaison, the group was presented with two items that helped us in finding potential topics to research, well as some background knowledge of the topics, located in London. The first was a pamphlet published by the Library of London which marks on a map the locations of museums and other scientific landmarks, as well as presented us with some history on the purpose of that location. Coincidentally, that pamphlet was named *City of Science*; however the pamphlet is out of print and no longer an exhibit at the Library. The second resource we were presented with was a book entitled London Science. This book is similar in nature to the *City of Science* pamphlet, but is more in depth on each entry, as well as divided into three sections that seemed to parallel to the sections of our project's Web site. These resources acted as a starting point for the team in the earlier weeks of the project as they were resources that were highly specific to our locality. With the team pointed in the proper direction, we were able to find potential topics that would easily pass the criteria required to further research the topic.

3.1.1.2 Suggestions from Liaisons and Advisors

Because the original sources provided to us were out of print, we had to rely on other means of finding newer places and events to feature on the Web site. The team also received suggestions from the liaison and the advisors of the project. Both types of suggestions took us to places and events that the team may not have found otherwise. The suggestions helped

us immensely in the beginning of the project by forcing the team to examine other sources of potential topics other than the book and pamphlet provided to us in the beginning of the project.

3.1.1.3 Internet Sources

As the project moved forward, the book became less reliably a source of potential topics, as the group ran into problems with the publication date of the book. The group was forced to look for newer sources of scientific activity in the City of London. Using the Internet, team members would search for new places and events that were occurring in London in the upcoming week. These sites provided us with newer potential topics, however, they had a harder time passing the criteria to become a topic for an article because they were not confirmed to be in London, which was important to fulfil in order for a potential topic to be considered as a topic for an article.

3.1.1.4 Selection Criteria

In order to select the most appropriate potential topics as serious topics for an article on the Cities of Science, the team was required to apply criteria to the potential topics that they had discovered. The team considers three main points when examining a potential topic for an article: Is the event or places featured interesting to you? Is the potential topic located in the Greater London area? Is there a similar entry on the Cities of Science Web site already? These three questions eliminated topics that were not appropriate for the site immediately. First, if the potential topic was not interesting to a particular team member, he or she would produce inferior work. Second, if the topic was not located in London, it is out of the scope of the London Cities of Science Web site. Finally, if the topic has already been covered by the Web site, our work would be redundant. Other minor criteria that were taken into consideration by team member when selected topics included: time required to complete an entry, previous exposure to a given topic, and any significant scientific importance of the topic. These minor criteria helped to eliminate any topics that the team would not have time to complete, the quality of writing of the topic, or topics that the public would find uninteresting. Once a topic has been selected, the team member begins the process of learning more about his or her topic, in order to cover it to the best of his or her ability.

3.1.1.5 Background Research

With a well defined topic of the article, the team members began to research the important aspects of their topic. Information such as the location of the article's focus, the cost of

admission, and hours of operation is collected to be used later in the interactive section of the article production process. Team members would also contact scientists, curators, or directors to enquire about special tours or an opportunity to interview a scientist at his or her establishment. The team member is responsible during this time to blueprint his or her interactive phase and establish the necessary contacts in order to write the article effectively.

3.1.2 Interactive Research

In the interactive phase, the team was primarily on-site visiting the places and events they researched in the preliminary phase and is illustrated in Figure 3.2. It was during that interactive phase of the article production process that the team members were responsible for getting enough information from the topic to write articles for submission to the Nuffield Cities of Science Web site, as discussed later in Section 3.1.3.

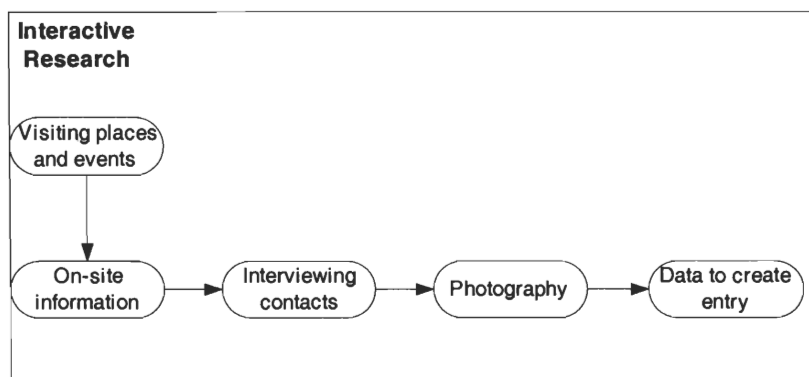


Figure 3.2 Interactive Research Diagram

3.1.2.1 Obtaining On-Site Information

In order to gather on-site information, team members would observe the events, exhibits and places in order to absorb the information that they would not be able to otherwise obtain from other types of research about an exhibit or place. Central to these visits were any sort of documentation about the topic of the article. The team found the most helpful items were pamphlets and booklets that were available at the topic of the article. These pamphlets and booklets often contained information about everything from the specific exhibits that were at a museum or learning centre to an overview of upcoming events and a mission statement of

the centres. The team also used its access to the exhibits, scientists, and learning centres to solidify the knowledge originally gained in the preliminary research phase of the process. The team did this by asking auxiliary questions to scientists or curators that reinforced its knowledge and to clarify any misunderstandings that it may have had with the presentation of the material. After reinforcing their background knowledge with on-site exhibits or research, team members could then meet with their scheduled scientists for more structured interview questions.

3.1.2.2 Interviewing with Contacts

Once a scientist or curator was contacted for an interview, the team member now had the responsibility of getting understanding the field of study of their contact. By understanding what the contact is involved in, not only did the team member save time by avoiding simple background questions and explanations, but the contact was more willing to open up to the team member's line of questioning because the contact saw that the team member was willing to intelligently discuss the contact's work. However, it is important that a reporter is not embarrassed asking questions that he or she feels to be obvious. (Knowlton, p.452) While interviewing it is important to also remember that a reporter isn't expected to know everything about the subject, but enough for he or she to figure it out when sitting down to write the story. (Knowlton, 452) For the team, this means that we needed to be sure to ask enough questions to have been able to write the article with the information that we collected at the interview. After the collection of on-site information or interview, the team member then had to find an image that would represent the topic to be included in the final article.

3.1.2.3 Photography

After collecting the information for writing an article, the team member then needed to take digital photographs for the production phase of the article writing process. When taking photographs, the team needed to be aware of some of the rules that govern photography in museums and other locations that we may visit. The reasons for these rules vary greatly as each location has its own specific reasons for requesting that photography not take place or other limitations (e.g. no flash photography, no tripods). The team addressed this validity threat to our main goal by investigating possible ways to get images through means that are favourable for all parties. Some of the methods for this included: speaking with the head curator in order to take original photographs, enquiring about permission from the proper authority to use existing digital photographs on our Web site, and enquiring about permission

from the proper authority regarding the free use of postcard images. However, these ways required getting permission from the proper authorities because there was the potential to create intellectual property issues, which needed to be avoided at all costs.

After addressing any initial problems with photography, the team members took photographs in a vertical orientation, in order to more easily integrate the image into the final publication on the Web site. Team members drew on their personal experience when selecting the subject for the photograph, but more discretion is needed when capturing the image. According to an article on image composition from Photographytips.com, “there is no right or wrong composition in photography. A composition that conveys a photographer’s intended meaning is an effective one.” (Composition) Therefore, a good representation or a poor representation of the topic was the standard for composition of the image. The subjects of the photographs illustrated an interesting fact about the topic, as well as the topic itself for the primary photography for the publication. Although Photographytips.com feels that there is no improper way to compose an image, Cameras.co.uk feels a few suggestions should be taken into consideration, such as, location of the sun, effects of weather, and cares to take with flash photography (Digital). The team travelled about the Greater London area on foot and via the tube, which proved difficult to bring proper photography equipment such as tripods, lighting devices, or multiple cameras. As a result, some photographs needed to be retaken if the image wasn’t as clear as the photographer would have liked.

After collecting the data from the primary source, the team’s job becomes understand the data that we have collected in the preliminary and interactive research phase of the article writing process. With this understanding, the team then proceeded to enter the production phase of the article writing process.

3.1.3 Production

Generally done at the end of the week, the team was responsible for producing eight articles per week for the approval, and subsequent posting, of our liaison. The writing process occurred in four phases, as illustrated in Figure 3.3. The existing format of the Cities of Science Web site is an article around 200 words in length, relevant hyperlinks, and an image 300 pixels in width. The team used the existing specifications for two reasons; the first is to

keep the new articles on the Web site consistent with older articles, and the second is to encourage visitors to the site to read through the entire article.

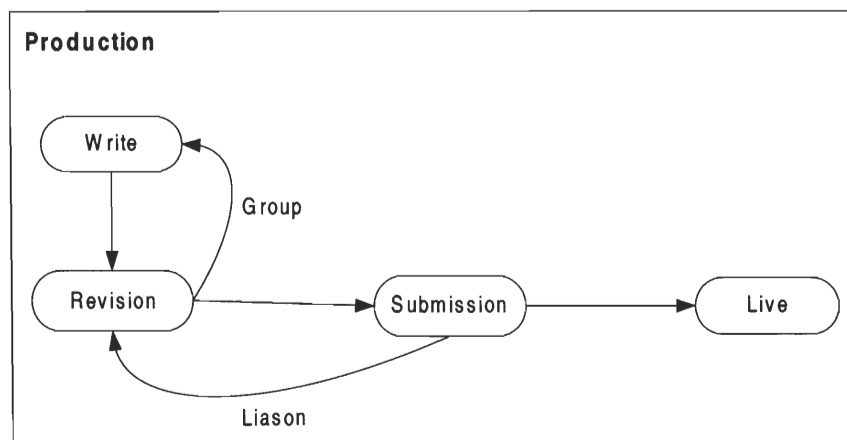


Figure 3.3 Production Diagram

3.1.3.1 Drafting and Initial Review

Before entering the article in the CMS software for publication, team members would write their articles in Microsoft Word, in order to check for spelling, grammar and other errors, and is later reviewed by other team members for any errors that may have been missed. While proofreading the article, the reviewer would look for misspelling, especially differences in British and American usages, clarity, and how interesting the article is to the others. After the reviewer provides suggestions for correction to the author, the article was corrected, and then resubmitted to the reviewer for a final read through before reaching the final product.

3.1.3.2 Digital Editing

Once the writing was completed, team members would move on to making the photographs from the interactive research phase acceptable for presentation on the web. This was accomplished by editing image properties, such as brightness, focus, and size. The digital images needed to adhere to the standard size of images on the Web site, approximately 300 pixels wide and 150 pixels tall. The team used primarily Adobe Photoshop, provided by the Nuffield Centre on the Macintosh systems. After the article and image had gone through the reviews of the other team members, the team then moved on to the second half of the production process.

3.1.3.3 CMS Software and Web Publishing

In order to publish the article to the Internet, team members were required to enter the finished document and any included content, including pictures and hyperlinks, into the Web publishing software used by the Nuffield Centre's Cities of Science Web site. This software, called CMS and made by OTHERmedia, is used by employees at the Nuffield Centre who interact with the backend of the Cities of Science Web site to add and maintain the content. The team would enter the data after the articles went through the production phase, following a pattern similar to Figure 3.4. Once submitted, the liaison could review the articles before final publication to ensure that our writing met the content and style requirements of the Nuffield Curriculum Centre.

3.1.3.3.1 Entering Text and Article Data into CMS Software

In order to submit article text, the team simply entered the text from the original document from an earlier step in the production process. In addition to locations for text pertaining to the article, the submission page afforded us a spot to put the main picture of the article, as well as placing pictures inline with the text using HTML.

3.1.3.3.2 Entering Hyperlinks and Images into CMS Software

In addition to entering text into the CMS software, the team was required to use the CMS software to upload hyperlinks and images into the CMS database. Because the CMS software does not reference images directly (i.e. through the file system of the server), the team was required to upload images and hyperlinks into online database. Examples of the forms for uploading images and hyperlinks can be found in Appendix A, and included fields for a title for the hyperlink or image, a description of the hyperlink or image, and a reference to the image or hyperlink itself. Once inputted into the database, the image or hyperlink was assigned a number which was later used to reference the object when used in the CMS software's basic mark up language. By placing images and hyperlinks within the article, we provided the visitor with an opportunity to see what the topic had to offer without necessarily going to the event or place that the article featured. With all the images, text, and hyperlinks uploaded, the team member's could preview the final product and tweak any formatting to the body text to include images and hyperlinks, as mentioned in Section 3.1.3.3.1.

3.1.3.3.3 Final Submission and Approval

After the team member was satisfied with the formatting of his or her article, we informed our liaison that we had articles ready for final review. If the liaison felt that the article

needed further corrections, the article would retain its pending status with the CMS software for us to edit. When the editing was completed, the articles would be resubmitted for approval to become live for viewing on the London area of the Cities of Science Web site, and able to generate traffic for the Web site, and registered with the WebTrends trafficking software.

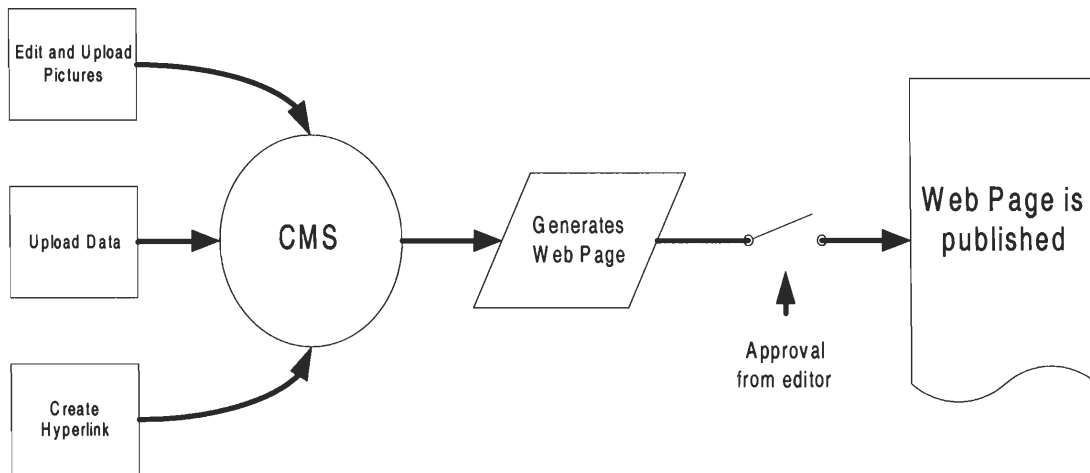


Figure 3.4: Flowchart of Submission Process

3.2 Traffic Data Analysis

The WebTrends software is a powerful tool that allowed us to see in great detail the statistics of the web server and the pages it has served. By seeing the statistics, we were able to analyse the effectiveness of the content that we generated while working with the Nuffield Curriculum Centre. According to an article posted on Second Moment, the types of data that can be found in the WebTrends software “are all critical elements in determining the effectiveness of a site and what can be done to improve it.” (Second Moment) The team analyzed three types of traffic data: the number of visitors per week, the average and median time of visits, and stratification of visitors by the duration of the visit. These data can be used to draw conclusions about the impact of the new content generated by the project team for the Cities of Science Web site.

3.2.1 Number of Visitors Per Week

The number of visitors that the Cities of Science Web site received in a week is an important figure of the raw number of people who the site received over the course of the project. The data collected can be stratified into individual pages, in our case, by our articles, and then compared the traffic to these articles to that of the entire Cities of Science Web site. By comparing the traffic to our articles to that of the entire site we were able to see the effect that the content the team generated had on the Cities of Science Web site. The number of visitors, however, is not solid measure of how effective the new content was for the Nuffield Curriculum Centre. There are many other important factors to page visits, like if the page was reached intentionally or accidentally. This is why the team decided to analyse the average and median time spent on pages, in addition to the number of raw visitors to the site.

3.2.2 Average and Median Time for Page Views

The amount of time spent on a page can determine a lot about the nature of the visit. As mentioned earlier, search engines query the Internet and return lists of possible matches for the user to explore. By examining the average and median amount of time that was spent on a page, we got an idea of the nature of the visit, and broke down the numbers we received from aforementioned collection into a general idea about the page. By looking at the average and median times we were able to determine if the majority of the visitors to a given page arrived there accidentally. However, this information provided us with an insight to the general visits to the page, not the visitors themselves. Therefore, we examined the stratification of visitors by the duration of time that was spent on the site.

3.2.3 Stratification of Visitors by Visit Duration

Compared to the other data that the team collected, this stratified data took into consideration the entire site's pages. The group examined the individual behaviour of each visitor to the site and could determine if those visitors arrived to the site erroneously and clicked away immediately, got to the page and it wasn't what the visitor was looking for, or found the page informative and stayed to read the page. The team determined that an accidental visit could be declared as a visit that is under one minute, indicating that the visitor didn't attempt to read the content of the page. The information on the visitor's habits will allowed us to examine the habits before and after the addition of the new content. The team then analyzed the numbers for any changes in the patterns of the viewing habits of the visitors to see how effective the addition of the new content was for the Nuffield Curriculum Centre.

3.2.4 Search Engine Query Analysis

Although valuable, trafficking data is not the only way to measure the effectiveness of the content that was produced for the Nuffield Curriculum Centre. The team found that using the same search engines that visitors used to find the site could be used to judge how frequently people would find our Web site. The team looked at the most popular search engine indicated in WebTrends, Google, to evaluate where we stood compared to other Web sites that could be found using the same query string (e.g. London science). We evaluated the ranking of our homepage at the beginning of the project, and made note of the position of our homepage with the given query string. The team then evaluated the rank of the homepage at the end of the project, and made note of which direction it travelled and by how many places. This data, however, is not as strong of a measure as the data created by the WebTrends software, but it offered the team an external measure of the popularity of the Web site.

4.0 Results

The primary result of our project was the creation of new content for the Cities of Science Web site. An important secondary result however, was the creation of new contacts within the scientific community. In an effort to make the content of the Web site sustainable, we contacted people within the community to inform them about the site and to persuade them to create new entries for the site.

4.1 Content Expansion

The team successfully completed the primary goal of the project by substantially increasing the content in the three main areas of the Cities of Science Web site (see Appendices C, D and E for a full listing of our entries). The team increased the total content on the London portion of the Web site by 38.9% percent. In total, 44 new entries were created by the team and published to the site; 27 new entries were created for *Places*, while 10 were created for *Where Science is Done*, and 7 were created for *Events*. The breakdown of all of the articles currently on the Web site can be seen in Figure 4.1.

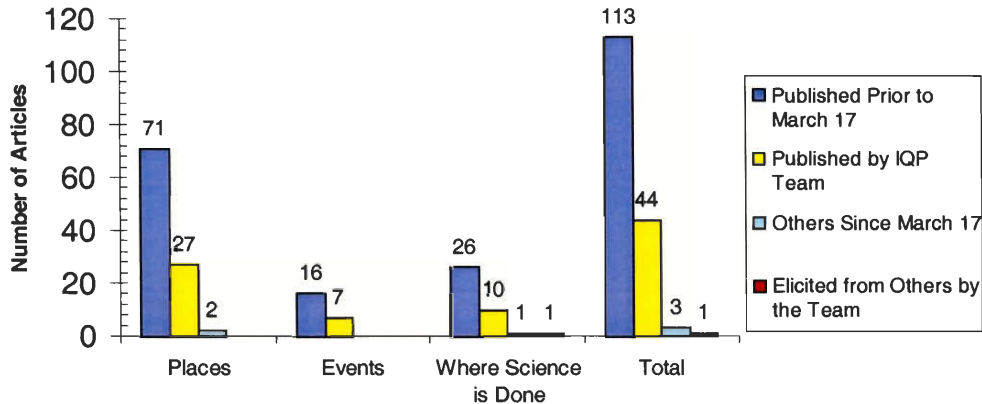


Figure 4.1 Breakdown of Entries by type.

Although the *Places* section of the site clearly saw the largest numerical increase in entries, the other areas actually saw larger percentage increases, as can be seen in Figure 4.2, which shows the percentage increases from the content added by the project team.

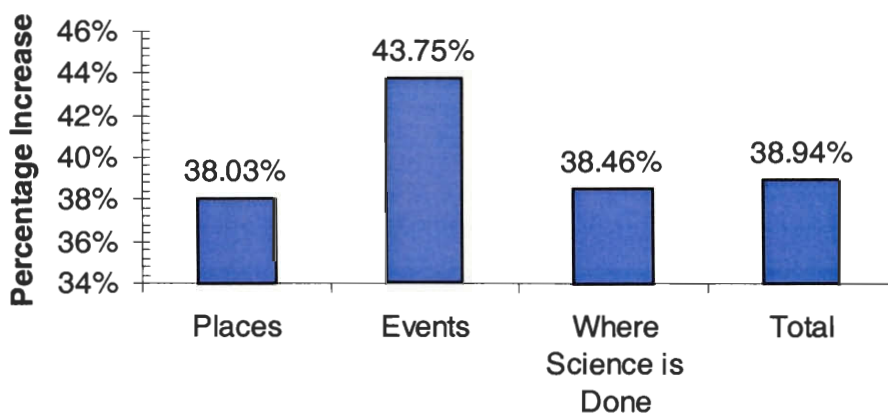


Figure 4.2 Percentage increases on the London Cities of Science Web site

4.2 Content Sustainability

While the sustainability of the content could not easily be quantified during the project, the team took measures to increase the probability that the content would in fact be sustainable beyond the end of the project. The team made contacts within the scientific community in order to solicit article submissions and increase awareness of the Cities of Science Web site. Additionally, the team entered links to five new Events Programmes, which are updated externally through the Web sites of the sponsoring organisations. The bulk of the remaining content created by the team will itself remain relevant indefinitely because most of entries for Places and Where Science is Done will not require substantial change in the foreseeable future. The bulk of the work that the team has done will not become irrelevant or outdated quickly.

4.2.1 Contacts

The team contacted researchers and institutions in various scientific fields (see Appendix B for a full listing) in an effort to convince them to use the Cities of Science Web site to continuously present their work to the public. While there is no way of knowing how many of the contacts will in fact create new content for the Web site, the team's efforts will not have been wasted; by contacting people the team was able to actively promote the site, effectively marketing the site to the scientific community. Although the site was primarily targeted at people outside of the scientific community, the Curriculum Centre suggested that it was also important to spread the name of the site to people within that community. Even

though we were unable to elicit any new articles from outside sources during the time frame of our project, we were able to make contacts within the scientific community and spread the name of the site within that community.

4.2.2 Events

The entries made by the team to the *Events* section of the Web site will ensure that the content will remain sustainable and relevant. The Events section of the site is divided into two sub-sections, *Upcoming Events* and *Event Programme's*. Of the 5 new entries created for the Events section of the site, all but two were in the Event Programme's subsection. The team chose to focus on the *Event Programme's* because they provided sustainable content, while entries in the *Upcoming Events* section would have become outdated after the events passed. The *Event Programme's* entries provide links to external Event listings, which are updated by the sponsors of the events. Because the *Programme's* are updated externally, the content of those entries will be sustained.

4.2.3 Where Science is Done and Places

Entries to the Where Science is Done and Places sections of the Web site will mostly remain relevant indefinitely, requiring little or no revision in the future. Research laboratories, such as the Darwin Centre are unlikely to change their mission in the near future, and their work will remain relevant for many years. With *Places*, the team made an effort to visit major sights, such as the Tower Bridge, which are the least likely to change in the near future. The team also visited some less publicized sites, such as the Wheel House at the Merton Abbey Mills, in order to bring them to the attention of the public. Through the choices that were made in these areas, the team worked to keep the content relevant for the long term; if the content remains relevant for the long term, the need for new content in the future will be reduced.

5.0 Analysis of Impact

While the majority of our effort was focused on the development of new and sustainable content, it was also important for us to attempt to analyze the impact of our new content. Unfortunately, the seven-week period that we had to complete the project was not long enough for us to assess the long-term impact of our work. We were however able to use various the Google Page Rank together with the WebTrends analysis package to assess the popularity of the Cities of Science Web site, and the new content that we created.

5.1 Google Page Rank

Initially the team believed that Google's ranking of the Cities of Science site would be an important determinant of the success of the project, but it was later found that the Google rank was not a reliable system for rating the site. Google uses a propriety system, known as PageRank®, to rate every Web site that it visits, unfortunately, Google does not allow the public to view the raw page rank data. By querying for a specific search phrase, the team hoped to get an idea of how the page rank was affected by the content added by the team. Initially the team found massive fluctuations in the rank from day to day. After the fifth week though, the ranking seemed to stabilize. In Table 5.1 we have shown the rank for the search phrase "science London" taken on Monday of each week.

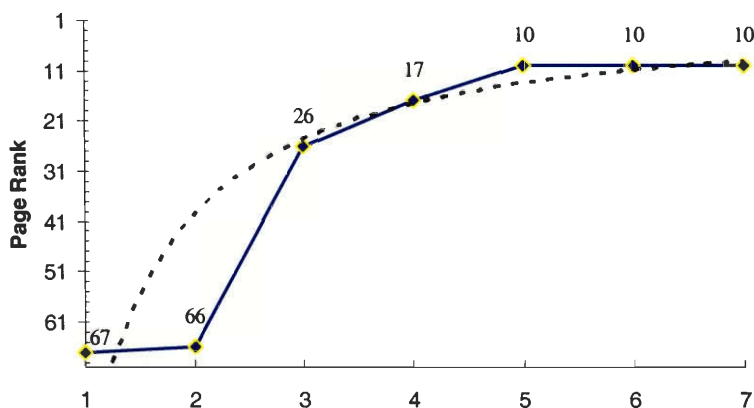


Figure 5.1 Google rank of Cities of Science Web site for the past 7 weeks

It should be noted that, during week four, the rank was highly unstable, and what is shown is the best rank that we measured for that Monday. During every other week, the rank was

stable for at least the measurement day. Because of the wide variation experienced during week four the team was forced to deemphasize the use of the Google Rank as a measure of success. Because the rating did stabilize again, the team was able to conclude that the Google Rank was suggestive of success. The week four data seemed to be an aberration, and the overall trend was encouraging. Because of the data problems during week four, the team acknowledged that the Google Rank, although interesting and suggestive could not be the primary measure of success. In a long enough time span, the data problems experienced during week four could have become insignificant, but the span of our observation period was not long enough to justify solid conclusions from the Google Rank alone. Luckily, the team was able to use a very powerful traffic monitoring system, WebTrends.

5.2 WebTrends

In order to determine how the site could be improved, the team analyzed the statistics from the WebTrends software to determine how the Cities of Science site was being used, and who was using it. WebTrends is a very powerful tool that tracks an enormous amount of data about the Web site. The team found that the new entries were doing well when compared with the old entries. It was also found that a large number of visitors to the site arrived accidentally. Ultimately the team found that the data suggested that the new entries would eventually do much to help the site, but the real benefits of the team's work would probably not be seen for some time.

5.2.1 Total Weekly Visitors

This report allowed the team to see how the traffic to the site was changing. As you can see in figure 5.2, the number of visitors to the site has been increasing overall since the site was first launched; this trend is emphasized by the dotted regression line.

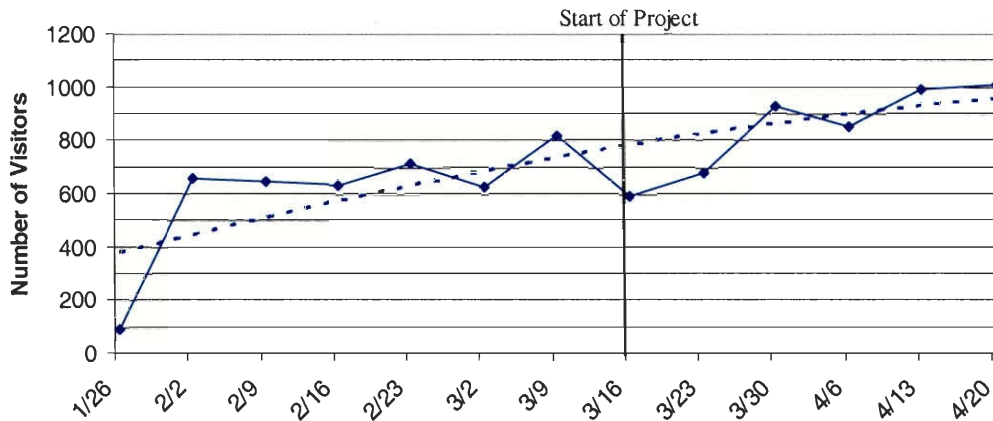


Figure 5.2 Number of visitors to the Cities of Science Web site per Week

5.2.2 Visitors to Individual Articles

Unfortunately, it was not clearly an indication of success to see that the total number of visitors per week increased over time since the site is still new, and the change could be attributed to a natural growth that would have happened without any intervention. In order to measure the impact the team’s content an additional report was used to find the ten most popular entries on the London area of the Web site during the first two weeks of April. The team found that of the top ten entries, shown in Table 5.3, five were written by team, shown in italics.

| Title | Number of views | Average View Time |
|---|-----------------|-------------------|
| Monuments to sewage | 52 | 3:50 |
| <i>Boldly going where no film has gone before</i> | 47 | 3:23 |
| The fight against cholera | 39 | 3:00 |
| <i>London Planetarium</i> | 39 | 4:00 |
| <i>Opening up science to the public</i> | 37 | 2:30 |
| <i>The magic of 007</i> | 35 | 3:29 |
| The bunker that Churchill slept in | 34 | 3:49 |
| <i>Architecture alive in London</i> | 32 | 3:36 |
| Technology in the service of time | 31 | 3:14 |
| Home for an historic herbal | 31 | 4:36 |

Figure 5.3 Top Ten Articles from April 1 to 26, 2003

The average viewing time for the entries shown in Table 5.3 was approximately three and a half minutes. This indicated to the team that at least some of the viewers actually read the

articles, and intentionally navigated to them. This is especially important because of the high incidence of accidental visitors that we discovered from the Cumulative Reports.

5.2.3 Duration of Visits

The team analyzed Cumulative reports from WebTrends in order to understand how the site was being used and who was using it. Because there was significant concern about the number of accidental visitors, the team chose to analyze how long the visitors stayed on the Web site. WebTrends allowed the team to see the visitors by the length of their visit. This data can be seen in Table 5.4.

| Duration (minutes) | Number of Visits | Percentage of Visits |
|--------------------|------------------|----------------------|
| 0-1 | 6,886 | 74.46% |
| 1-3 | 437 | 4.72% |
| 4-6 | 298 | 3.22% |
| 6-10 | 218 | 2.35% |
| 10-15 | 232 | 2.52% |
| over 15 | 1177 | 12.73% |

Figure 5.4 Number of Visits by the duration of visits

From the data in Table 5.4, the team found that only about 25% of the visits to the Cities of Science Web site lasted more than one minute. We theorised that most of the visitors to the site who stayed less than one minute arrived accidentally and did not stay to navigate the site; conversely, we assumed that visitors that stayed for more than four minutes were visitors who stayed to navigate the site, what we call intentional visitors. If the team was successful in creating captivating entries, it is quite possible that more accidental visitors will stay to navigate the site, thereby increasing the user base of the Web site eventually. Unfortunately, it was impossible to directly assess the impact of the team's efforts on the amount of time that visitors spent on the site.

6.0 Conclusions and Recommendations

The team achieved the primary goal of increasing the content on the Cities of Science Web site, and the secondary goal of creating contacts to make the content sustainable. The team increased the content in each of the three major sections of the London area of the site, but although the team made numerous contacts, very few were willing to create content for the Cities of Science Web site. Even though most of the contacts were unwilling to create entries, a few did show interest in the site, and indicated that in the future they might be willing to create new entries. The contacts that were made by the team, and the content added by the team will help to ensure that the content on the Web site remains sustainable.

In order for the content to remain sustainable, the site must have a solid user base of individuals willing to post to the site. Unfortunately, from the WebTrends data, it does not appear that there is currently a substantial user base. Although the traffic to the site increased substantially during the course of the project, there were still very few outside articles, and most visitors did not stay for more than a minute. Additionally, the team found that most of contacts we made had never even heard of the Cities of Science Web site. The Nuffield Curriculum Centre could do much to enhance the popularity of the Cities of Science Web site in order to increase their user base.

We recommend that the centre begin advertising the site through a series of targeted advertisements. In addition, we suggest that the Centre publish guides for creating new entries in order to keep the content sustainable. Finally, we recommend that the Centre create an enhanced system for rating articles to increase user participation and provide feedback about article quality.

6.1 Advertising to Increase Intentional Visitors

We found that the number of visitors who did not thoroughly navigate the Cities of Science Web site was disproportionately high compared to the number of visitors who did stay to navigate the site. Less than 21% of the visitors to the Web site stayed longer than four minutes, and the vast majority of visitors, about 75%, stayed less than one minute. In order to increase the number of visitors who stay and view multiple pages on the site, we

recommend that the Curriculum Centre begin a series of targeted campaigns to announce the site to the public.

6.1.1 Advertising to the Public

Our research has show that the public is largely disinterested in science. Because a large portion of the public would not be interested in the Web site, we recommend that advertising should, at least initially, be targeted at people who already have an interest in science. In order to reach those people who are already interested in science, advertisements should be taken out in magazines and Web sites which have the goal, similar to the Web site, of bringing the science to the public. Such publications would allow the Curriculum Centre to present the Web site to a subset of the public that would be more likely to use the site than the population as a whole.

6.1.2 Advertising to Schools

In addition to advertising to the adult public, the Centre should also focus on bringing the site to school-age children. The easiest way to inform students about the web-site would be through their teachers. Because teachers are the best suited to spread the site to the students, we recommend that the Centre create a "Teacher's Guide" that briefly summarizes what the site is about and highlights key points about the site, especially the ability to add new entries. The Centre could also integrate the Cities of Science Web site into the Science Curricula they distribute, showing teachers how to use the Web site to enhance their lessons.

6.2 Eliciting Outside Entries

Currently, the majority of the entries on the Web site are entries that have been created by individuals working for the Curriculum Centre, including members of our project team. In order to keep the content on the site sustainable for the long term, it will be necessary to increase the number of entries generated by outside entities, specifically in the area of *Where Science is Done*. We found that it was quite difficult to convince people to create entries for the site; some did not feel that the site was an appropriate place for their work, while some just did not have the time. In order to convince scientists, researchers and companies to present their work to the public, we recommend that the Curriculum Centre develop a series of concise handouts that explain how and why scientists, researchers and companies should present their work through the Cities of Science Web site.

6.2.1 Why Create an Entry? Handout

Of the handouts that we are recommending, the handouts that explain why to create an entry are the most important. If the companies, scientists or researchers are not convinced that the Cities of Science Web site is an appropriate venue for their work, they will not create new entries on the site. We found that when dealing with scientists, they were most interested in using the site to interest the public in the science that they do, while companies were most interested in using their entries as free advertisements for their work or products. Because of this we strongly recommend that two separate handouts are created, one for Scientists and Researchers, and one for Companies. The handout for Scientists and Researchers could be centred on the idea that they should publish their work on the site to make the public more aware of science in general, while the handout for companies would be focused on the idea of improving public image, and free advertisement.

6.2.2 How to Create an Entry Handout

The groundwork for the How to Create an Entry handout has already been established. The Cities of Science Web site has detailed descriptions of how to create entries, but we found that it is not always easy to use the guidelines while creating a new entry; a second window has to be open to view the recommendations while creating a new entry, inconveniencing the writer. Because of this we are recommending that in addition to the existing online style book, the Centre develop a paper style book and entry guide. In addition to the information presented in the online guides, the handout should include examples of each type of entry.

6.2.3 Clarifying Where Science is Done

The Where Science is Done section of the site is one of the most difficult to create new content for. We found that in order to create new content for this area of the site, contacts had to be made outside of the Curriculum Centre to provide information for the site. Unfortunately, we found that most of the people we spoke to did not understand what belonged in the *Where Science is Done* section of the site. The Where Science is Done section of the site is used to present current research and scientific activity in the city, but most of the people that we contacted believed the title Where Science is Done constrained their sponsor institution to one article. We conclude that the title *Where Science is Done* may limit the sustainability of the Web site. Because of this, our group would recommend either renaming the *Where Science is Done* section to something more descriptive, such as *Research*

and Activity, or providing a detailed description of the Where Science is Done section on the Home page of the Cities of Science site and in the guide book for creating new entries. If the public has a better understanding of the Where Science is Done section of the site they will be more likely to post new entries under that area of the site.

6.3 Enhanced System for Rating Articles

WebTrends is an incredibly useful and powerful evaluation package, but unfortunately it has limitations. The package is unable to report whether visitors to the site actually enjoyed the articles that they read, so all of the conclusions about the quality of the articles has to be based on the circumstantial data provided by the amount of time and the number of visitors to each article. Through our research we have found that one system common on other Web sites (see appendix F), such as the MSNBC, and Amazon, is a ratings bar, which allows readers to rate how helpful or interesting an article was.

We recommend adding a rating bar to the bottom of all of the articles, in order to track which articles are truly the most popular with the public. In addition, the ratings bar could help increase user interest in posting new articles. A rating bar is not without problems; it will add clutter to the pages, it may be difficult to implement, and not everyone will use it seriously, but in conjunction with the Web Trends data, the user ratings of articles could be an invaluable tool to determine which articles are the best articles in the opinion of the public. The bar could be used to provide a list of the top articles, which could be listed on the front page of the site, highlighting the best articles automatically. This data would allow the Curriculum Centre to decide which formats work best for presenting articles, and which topics the public finds most interesting.

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Appendix A Data Entry Forms for the Cities of Science Web site

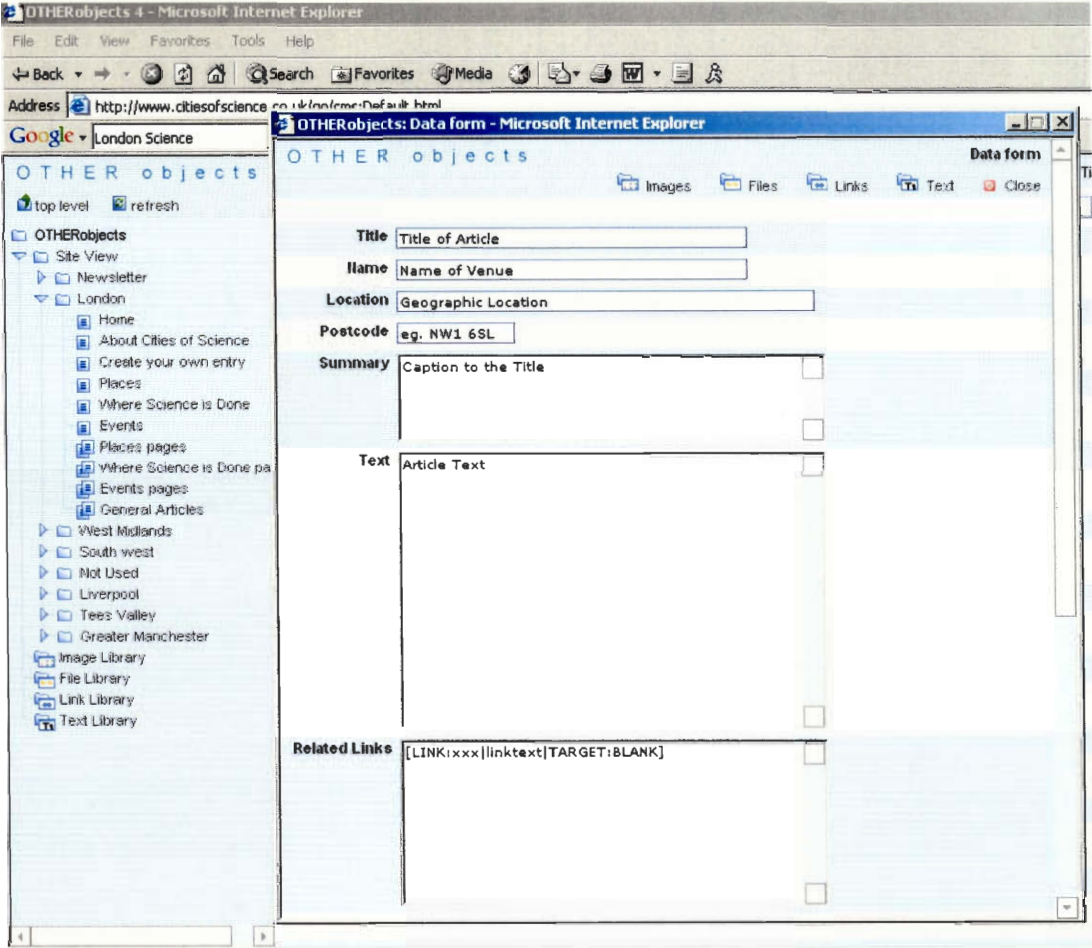


Figure B.1 CMS Form for Inputting Article Text

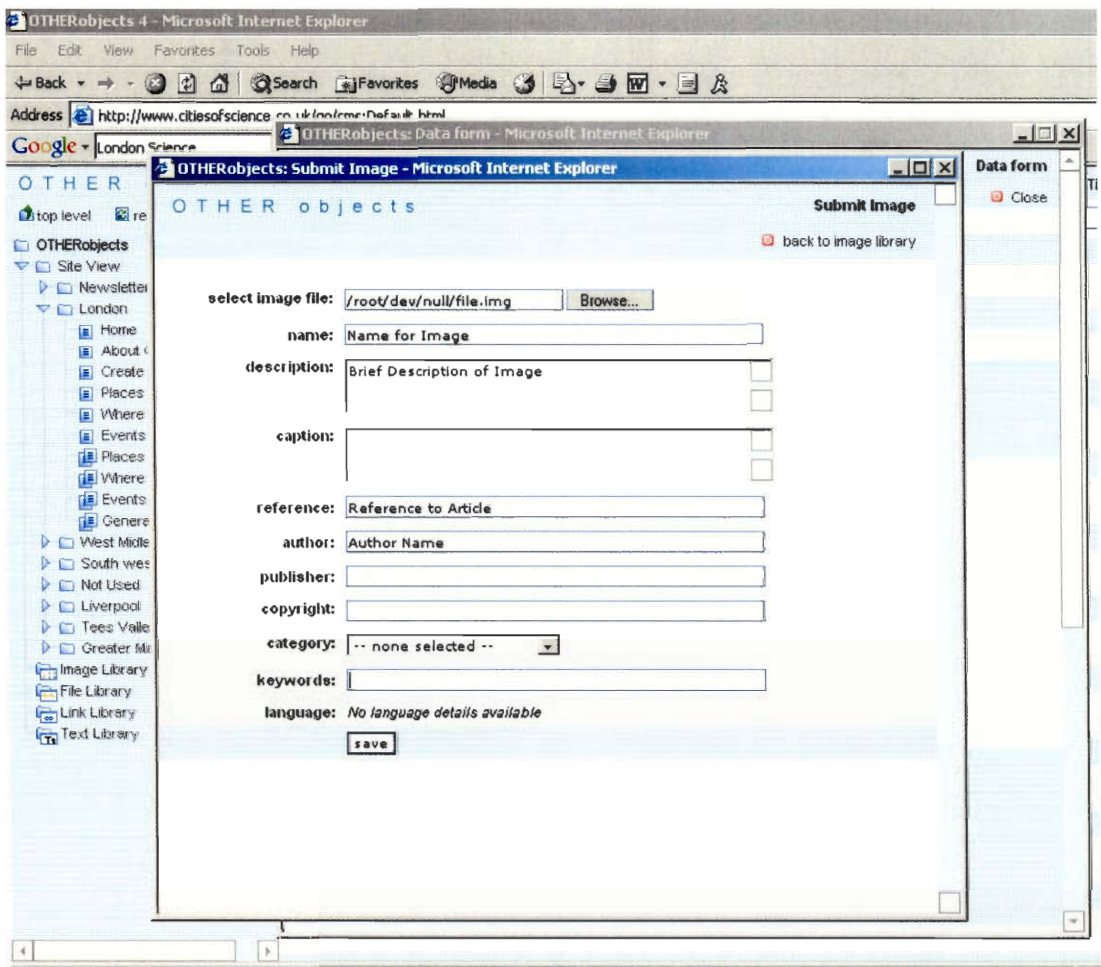


Figure B.2 CMS Form for Uploading Images

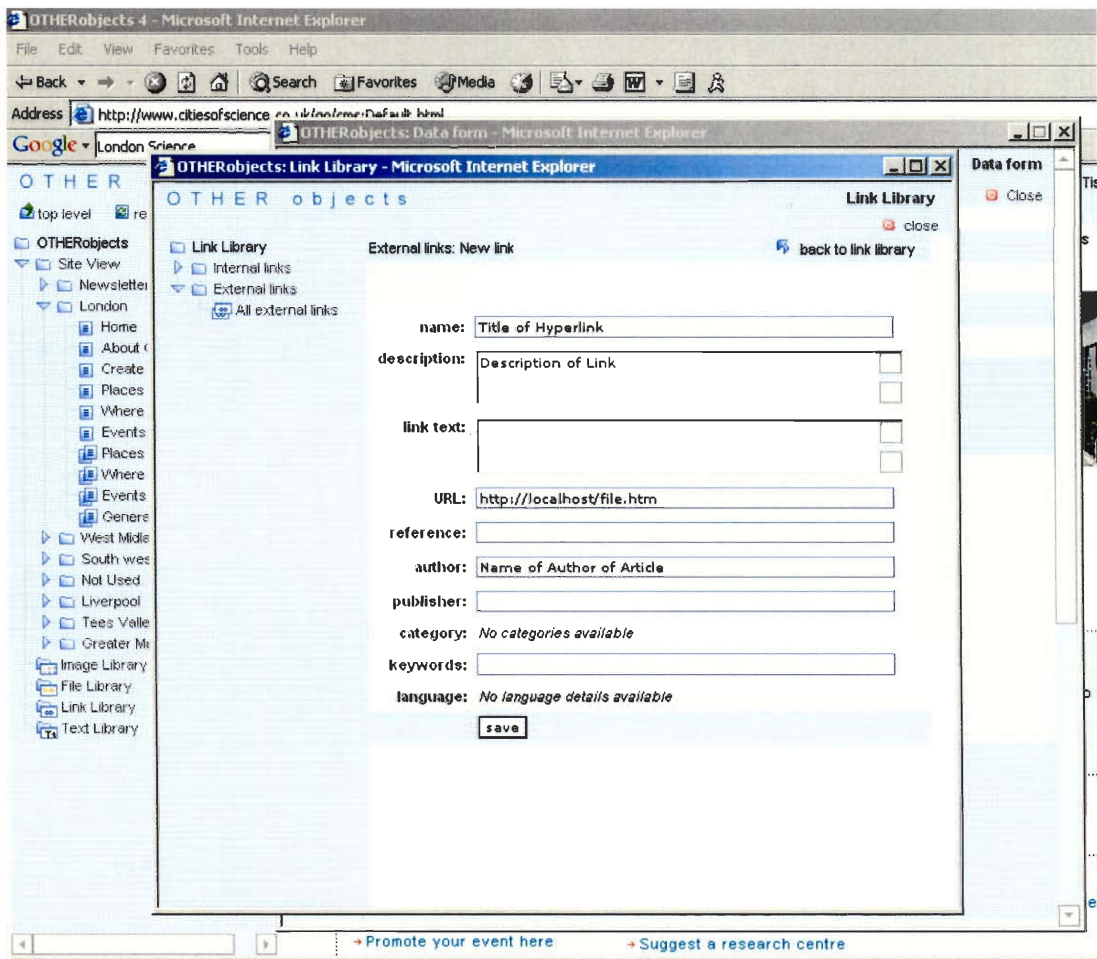


Figure B.3 CMS Form for Registering Hyperlinks

Appendix B Contact List

| Society or Title | Contacted | e-mail | phone | Address | Reply | Disposition |
|---|-------------------------------|--|---------------|--|-------|---------------------------------------|
| ICE (Civil Engineering) | Receptionist/listed contact | library@ice.org.uk | 020 7222 7722 | 1-7 Great George St, London, SW1P 3AA | No | |
| IMO ³ (Materials, Minerals & Mining) | listed contact | admin@materials.org.uk | 020 7451 7300 | 1 Carlton House Terrace, London, SW1Y 5DB | No | |
| IEE (Electrical Engineering) | listed contact | postmaster@iee.org.uk | 020 7240 1871 | Savoy Place, London, WC2R 0BL | No | Receptionist helpful |
| IMAREST (Marine) | listed contact | info@imarest.org | 020 7382 2600 | 80 Coleman Street, London, EC2R 5BJ | No | |
| IMECHE (Mechanical Engineering) | listed contact | enquiries@imeche.org.uk | 020 7222 7899 | 1 Birdcage Walk, London, SW1H 9JJ | No | Library staff helpful |
| ZSL (London Zoological Society) | PR department (Debbie Curtis) | enquiries@ioz.ac.uk | 020 7449 6363 | Regents Park, London, NW1 4RY | Yes | Did not want to be featured |
| IMAX films | PR department | info@imax.com | | Ontario Canada | Yes | Awaiting further response |
| Ken Hullock (Council of Brent) | Environmental Department | ken.hullock@brent.gov.uk | | Brent House, 349 High Road, Wembley, HA9 6BZ | Yes | Very Helpful; Allowed interview |
| Arsenal Football Team | PR Department | press@arsenal.co.uk | | Arsenal Football Stadium | Yes | Medical Staff doesn't talk to media |
| Primal Pictures | Sloan Hickman | sloan@primalpictures.com | | 159-165 Great Portland Street, London, W1W 5PA | Yes | Extremely helpful. Submitted an entry |

| Society or Title | Contacted | e-mail | phone | Address | Reply | Disposition |
|--|-----------------|--|---------------|---------|-------|---|
| Host of Darwin Centre Live | Matt Kaplan | matthew.kaplan@nhm.ac.uk | | | Yes | Helpful, reviewed our entry about the Centre |
| Press Officer, Kings College London | Ruth Francis | ruth.francis@kcl.ac.uk | | | Yes | Forwarded interview request to King's professors |
| Senior Lecturer, Kingston University | James Orwell | KU14009@atlas.kingston.ac.uk | | | Yes | Request for interview went unfulfilled |
| Communication and Marketing Manager, London Wetland Centre | Martin Senior | Martin.Senior@wwt.org.uk | | | Yes | Helpful, offered help in organising visit to WWT |
| Centre Manager, The London BioScience Innovation Centre | Emma Wright | | 020 7691 1122 | | No | |
| Rockstar Games | Jeff Castaneda | Jeff@rockstargames.com | | | No | |
| Sainsbury's (Contacted about environmental science projects) | Ian Hare | Ian.Hare@sainsburys.co.uk | | | Yes | Forwarded information to relevant team. No further response |
| Tower of London Maintenance Director | Tony King | | | | Yes | Helpful, but unavailable |
| Senior Lecturer, Kingston University | Jonathan Briggs | | 07802 430 843 | | Yes | Leaving for holiday, returning after end of project |

Appendix C Place Entries Written by the Project Team

Taming the Thames

The Thames Barrier



Rising from the River, the nine silver gate houses of the Thames Barrier seem to form an avant-garde sculpture rather than one of the most important flood barriers in the world. When the gates of the barrier are raised in the defensive position, a wall of steel more than half a kilometre long and twenty metres high stands between the deadly swell of the river and the City of London.

Tides which threaten London

The River Thames, which runs through the centre of London, is a tidal river. A tide is a change in the water level that is actually caused by the gravitational pull of the moon on the water. Every day there are two high tides and two low tides as the moon rotates around the earth. Normally this daily cycle is not a problem, but when certain weather conditions occur in confluence at the correct time in the lunar cycle, a surge tide is created. Surge tides have historically been one of the greatest threats to the City of London.

Taps to turn off the tide

The gate houses of the Barrier can, in a matter of minutes, rotate their protective gates to stop an incoming surge tide from devastating the City; however, there is generally 36 hours warning of a surge tide, and the gates are raised well in advance of the upcoming surge to avoid a dangerous reflection wave that could cause damage downstream. Without the Barrier, the City would be at serious risk. If a surge tide reached Central London today, it could cost the City in excess of £30 000 m.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 04 April 2003

If you are curious, check out the [Thames Barrier Background](http://greenwichengland.com/tourism/barrier.htm)
<http://greenwichengland.com/tourism/barrier.htm>

For detailed information about the Barrier, and Flood Protection, you should take a look at the [Official Site of the Thames Barrier](http://www.environment-agency.gov.uk/regions/thames/323150/335688/341764/) <http://www.environment-agency.gov.uk/regions/thames/323150/335688/341764/>

If you would like to see the Gates of the Barrier in the Defensive Position, see [Scheduled Closings and Maintenance](http://www.environment-agency.gov.uk/regions/thames/323150/335688/341764/362880/) <http://www.environment-agency.gov.uk/regions/thames/323150/335688/341764/362880/>

The Green Dream

Sainsbury's Greenwich



Natural light floods the sales floor, earth mounds surround the building and almost nothing is wasted. It may sound more like a bronze-age village than a modern supermarket, but there is no doubt that the Sainsbury's in Greenwich is truly a technological Marvel.

Power Saving

The thick concrete walls of the building are girdled by mounds of natural earth. The mass helps to hold the temperature in the store constant, keeping out the heat in the day, and the cold at night. The earth forms a thick, natural insulation. Power saving seems to be the major innovation of the Greenwich store; even the outdoor signs are powered by solar and wind power.

Waste Reduction

Almost nothing is wasted; 90% of the energy that would otherwise be wasted by refrigeration equipment is reused to warm the sales floor of the revolutionary store. The rain water that hits the roof is recycled and used to provide water for the numerous plants of the market. The waste food is sent away, and is eventually turned into useful compost, a natural fertilizer.

Rarely is a supermarket a bastion of scientific innovation, but Sainsbury's, a company known for its environmental concerns, has created what could well be the Greenest Supermarket in the World.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 14 April 2003

Links:

For detailed information check out the [Sainsbury's Greenwich Official Site](http://www.sainsburys.co.uk/greenwich/).
<http://www.sainsburys.co.uk/greenwich/>

A Balanced design

Tower Bridge



Although its reception in 1894 was far from favourable, the Tower Bridge has become an unmistakable London Landmark and a National Treasure. The bridge, with its majestic stone-faced Gothic Towers was designed to be both elegant and practical.

The bridge is really three bridges in one: the spans from the shores to the towers are suspension bridges, the pedestrian walkways are truss bridges, and the most interesting of all is the centre span, which is a Bascule Bridge. The centre span of the Bridge consists of two balanced, counterweighted sections, known as bascules, that are raised to allow tall ships to pass beneath the Bridge. When the Bridge was first opened, steam engines powered the hydraulic system that raised and lowered the bridge. Today electricity powers the system to raise and lower the bridge. The bridge today rises in 60 seconds and lowers in 75 seconds. The original steam powered system could actually lower the bridge 15 seconds faster than the modern system.

From Walkways to View Ways

In the original design, the upper walkways that connected the two towers of the bridge allowed pedestrians to travel freely even when the central span was raised, but the walkways soon fell into disuse. Because of this, the walkways were closed from 1910 until 1982, when an act of parliament reopened them. Today, the walkways have been converted to serve as viewpoints for the city skyline.

The Bridge Today

Of the 29 bridges currently spanning the River Thames, the Tower Bridge is the only movable bridge. When the Bridge was first opened, it opened more than 1000 times per year, but today the bridge opens fewer than 100 times per year. Visitors today can see the viewpoints along the upper walkway and tour an original engine room, if they are lucky, they may even be able to catch the bridge being raised for a ship.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 01 April 2003

Links: If you want to find out when Tower Bridge will be opening look at the [Scheduled Bridge lifts](http://64.33.67.188/VideoPages/liftlist.htm) for a full timetable. <http://64.33.67.188/VideoPages/liftlist.htm>

To find out more about Tower Bridge and its history, go to the [Tower Bridge](http://www.pbs.org/wgbh/buildingbig/wonder/structure/tower.html) Web site. <http://www.pbs.org/wgbh/buildingbig/wonder/structure/tower.html>

Standing at the Centre of Time... and Space

Greenwich Mean Time and the Prime Meridian



The Royal Observatory at Greenwich is the home to both Greenwich Mean Time (GMT) and the Prime Meridian.

Greenwich Mean Time (GMT)

Greenwich Mean Time was, for many years, the standard on which all other times in the world were based. The world is divided into 24 time zones, one for each hour of the day. A timepiece at the Royal Observatory kept the time on which all other clocks in the world were either directly or indirectly set. All of the other time zones were defined by the number of hours they deviated from GMT.

Prime Meridian

The Globe is divided into 360 degrees of longitude, which are represented by the lines on a globe that run from the north and south poles. The Prime Meridian is the North-South line at zero degrees. Today a laser at the Royal Observatory indicates the Prime Meridian at night. The laser can be seen up to 16 km (10 miles) away.

Meridian and GMT Today

Navigational charts and sky maps today are still based on the convention that places the Prime Meridian at the Observatory in Greenwich. GMT was considered the fundamental time of the World until 1972, when Co-ordinated Universal Time (UTC) superseded GMT. Today some still refer to UTC as GMT. Because UTC still uses a system based on the Prime Meridian, the Royal Observatory is always the first place where a new day begins and an old day ends according to the world's time.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 02 March 2003

Find out more about the [Meridian Laser](http://news.bbc.co.uk/1/hi/uk/568479.stm). <http://news.bbc.co.uk/1/hi/uk/568479.stm>

For General Information try the [Official Site](http://www.nmm.ac.uk/server.php?navId=005000002002)
<http://www.nmm.ac.uk/server.php?navId=005000002002>

Curious to ask: [What is Universal Time?](http://aa.usno.navy.mil/faq/docs/UT.html) <http://aa.usno.navy.mil/faq/docs/UT.html>

Getting from point A to point B

London's Transport Museum



In December of 1890, the first underground electric railway in the world was opened in London. Today, the London Underground carries over 900 million passengers each year. The Transport Museum in London gives you a unique opportunity to look at the past, present, and possible futures of transport in London.

The Past

The London Underground was born in an age when the public travelled by steam trains and horse-drawn carriages. Many of these original carriages and trains sit in the Museum, silent reminders of days long gone. Beyond these carcasses sit some vintage tube cars, also just hollow shells of their former selves, their utility betrayed by their beauty and grace. The Underground was not just an engineering marvel; the Underground was a work of art.

The Present

The electricity that powered the tube trains to their early success now powers onboard computers that can essentially drive them without any human input at all. On the newest trains, the driver sits almost as a vestige of the past, doing little unless there is an emergency. New technology allows the trains to run more efficiently and with less down time than ever before. The tube today is less art, and more science.

The Future

Where is the London Transit system headed in the future? There may be no way to know that for sure, but it is interesting to see how some people visualise the future of the transportation network. In the Museum there is an exhibit that looks at some of the far-fetched and not so far-fetched ideas that people have had over the years for the future of public transit. We may never see a teleportation pad, but you never know. The only thing that is certain is that the future of public transportation will continue to be shaped by scientific innovation.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 10 April 2003

If you want to learn more, see the [Official History of the Tube](http://www.thetube.com/content/history/).
<http://www.thetube.com/content/history/>

For details about the forgotten stations of the Underground, take a peek at [Ghost Stations of the Tube](http://www.starfury.demon.co.uk/uground/index.html)
<http://www.starfury.demon.co.uk/uground/index.html>

The Great White Elephant

The Millennium Dome



Seven million visitors celebrated the new Millennium by visiting the Dome but this fell far short of the ambitions of its sponsors. The Dome may have been a political and commercial failure but it was a very considerable engineering achievement.

Engineering success

Constructed primarily of steel, glass fibre and plastics, The Millennium Dome is the largest dome in the world. Its dimensions are incredible; the dome is 320 metres in diameter and 50 metres high at the centre.

The twelve steel masts that support the structure rise some 100 metres from the ground. The masts connect to the roof panels with over 72 km of high strength steel cables. The panels are constructed of glass fibres coated with PTFE, which is commonly known as Teflon®, and are self-cleaning.

Public failure

While the Dome is truly an amazing technological achievement, it has so far been a commercial failure. Since the closing of the Dome in 2001, there have been many ideas for creating a commercially viable use for the Dome, but so far none have been implemented. And so the Dome sits, a white elephant, on the banks of the River Thames

Submitted by: A. Wallen, Worcester Polytechnic Institute, 04 April 2003

Links:

Since you can't go there in person, why not try the [Millennium Dome Virtual Tour](http://news.bbc.co.uk/1/hi/english/static/in_depth/uk/2000/dome_tour/default.stm) to waht it was like in the year 2000. http://news.bbc.co.uk/1/hi/english/static/in_depth/uk/2000/dome_tour/default.stm

If you are interested in the architecture of the Dome, examine the [Structure of the Millennium Dome](http://architecture.about.com/library/blmilldome.htm). <http://architecture.about.com/library/blmilldome.htm>

If you are interested in some general background and interesting statistics, check out these [facts about the Millennium Dome](http://www.greenwichletting.co.uk/dome.html). <http://www.greenwichletting.co.uk/dome.html>

Lions and tigers and diplodocus, Oh my!

The Natural History Museum



Beyond the architecturally intriguing façade of the Natural History Museum are exhibits that span the length of the universe's natural history. From meteorites that came from the beginning of time, to exhibits that predict the death of our sun, the Museum comprises 20 million millennia worth of natural science.

You are meandering through the Natural History Museum, but then, oddly enough, you suddenly find yourself in a Japanese supermarket. As questions begin pouring through your confused mind, you suddenly become acutely aware that the floor beneath you has begun to tremble. The trembling intensifies until, several seconds later, the floor stabilises; it is then that you realise you had wandered into the Museum's earthquake simulator.

Typical of many of the Museum's exhibits, the simulator seeks to bring a new level of interaction with the natural sciences. You will quickly find yourself immersed in the science of the museum. The Museum encourages you to learn in a fun way; the interactive exhibits and the helpful staff will encourage people of all ages to appreciate the Natural Sciences.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 28 March 2003

Find out more from: [Natural History Museum Homepage](http://www.nhm.ac.uk/news/index.html) <http://www.nhm.ac.uk/news/index.html>

Curious about ages, eras and eons? Try the [Geological Time Scale](http://geology.er.usgs.gov/paleo/geotime.shtml) <http://geology.er.usgs.gov/paleo/geotime.shtml>

Interested in what kind of science is occurring behind the scenes? Check out the [Darwin Centre](http://www.nhm.ac.uk/darwincentre/live/) <http://www.nhm.ac.uk/darwincentre/live/>

Get Inside the Head of Sigmund Freud

Freud Museum



Preserved by his daughter after his death, the Freud Museum allows you to examine the home of the father of psychoanalysis.

Escaping Nazi Germany after the annexation of Austria in 1938, Sigmund Freud moved to London and died a year later. The museum is decorated in the many antiques that Freud collected during his life, but most notably, the museum houses Freud's personal collection of books and his psychoanalytical couch, where patients would have their sessions. The Museum operates a library of Freud's collection for research purposes only.

Psychoanalysis is the practice of treating emotional or mental disorder through therapeutic talks with a psychoanalyst. The purpose of these talks is to create a forum where the logical filtering of the thought process is removed and thoughts on the mind are expressed. This sets the analytical stage and allows progress to take place as the patient comes to grips with himself on an intellectual and emotional level. Freud has many followers, the first of which was his youngest daughter Anna, who is known for her work in the field of child psychoanalysis.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 17 April 2003

Admission to the museum is £5.00 for adults and £2.00 for concessions.

The [Freud Museum Web page](http://www.freud.org.uk/index.html) <http://www.freud.org.uk/index.html> has information on operating hours and directions to the Museum, or you can click to [the Freud Museum Online Research Centre](http://www.freud.org.uk/fmrese.htm) <http://www.freud.org.uk/fmrese.htm> for information regarding the Museum's library.

As technology improves so do nautical charts

National Maritime Museum



As methods for cartography and hydrography improved, so did the quality of maps produced across the world.

Science on the back of cartography

The Beagle exhibit features the travels of HMS Beagle. Not only famous for her important role in Charles Darwin's theories, she was commissioned for exploration in South America and Oceania. During these periods of time, she was responsible for the creation of charts and maps for use by other mariners.

Charting the seas

Examples of these charts and maps can be found at the exhibit of cartography and hydrography. Cartography is the practise of making maps, and hydrography is the practise of making charts for the oceans. This exhibit houses over 100 000 different maps and charts from various personal collections. The charts date back to as far as the fifteenth century.

From pen to computer

As the charts get newer, you can see the development in chart making instruments. First drawn and on the hides of animals, the maps became more reproducible, through the use of printing, and then finally, the use of computers to chart, store and reproduce highly detailed charts and maps of the oceans.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 04 April 2003

Please visit the [National Maritime Museum's homepage](http://www.nmm.ac.uk/) <http://www.nmm.ac.uk/> for information about visiting the museum.

The fighting ship that remains vigilant on the River Thames

HMS *Belfast*



At sixty-five years of age, and twenty-six years of combat experience, HMS *Belfast* is a living monument to the British Empire.

Responding to the faster and larger cruisers of the United States and Japan, the Admiralty ordered the modification of the existing Southampton class cruiser to improve secondary and anti-aircraft weapons. Meeting the new design seemed impossible as the Admiralty requested that the ship remained as close to speed with other ships in the modified Town, or Southampton, Class Light Cruisers, while adding more firepower. HMS *Belfast* was the second of two ships of the new Edinburgh class designed to meet these new specifications of improved weaponry and demand for speed. With four steam engines and moving at 32 knots, HMS *Belfast*'s primary function in the Royal Navy was the protection of merchant vessels and their trade routes.

In times of war, HMS *Belfast* served in many capacities. During the Second World War, she saw action against the German fleet in the North Atlantic as the flagship of the 10th Cruiser Squadron, as well providing artillery support during the Normandy invasion on beaches Gold and Juno. During the Korean conflict, HMS *Belfast* was one of the first British ships to fire artillery, supporting troops on the ground.

By the 1950s, however, seaborne heavy guns were becoming redundant as the role of shipping in war was transformed into that of carrying aircraft, troops and supplies.

After seeing her last days of combat, HMS *Belfast* continued touring the globe as a symbol of the British Empire. As the 'wind of change' swept over the Empire, HMS *Belfast* was present when the Union Jack was lowered in many British colonies as they became independent nations.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 02 March 2003

Visit HMS *Belfast*'s [homepage](http://www.iwm.org.uk/belfast/) <http://www.iwm.org.uk/belfast/> for more information on HMS *Belfast*, or for this Web site for concise [specifications](http://www.maritime.org/hnsa-belfast.htm) <http://www.maritime.org/hnsa-belfast.htm> of the ship and her tours of duty.

Historical astronomy comes to life

Royal Observatory



Not just the home of the Prime Meridian, Greenwich Observatory houses the works of many great astronomers.

Founded by King Charles II in the year 1675, the Royal Observatory was established to solve the problem of navigating the globe. While at sea and away from the sight of land, it was impossible for ships to find how far they had travelled in the direction of east and west. Appointed at the inception of the observatory as Astronomer Royal, John Flamsteed set out to solve this great problem.

In order to accomplish this monumental task, Flamsteed was first required to map the fixed stars accurately and, second, to systematically observe the movements on the sun, moon, and other planets. The charts that these two tasks yielded, allowed vessels at sea with no bearing on land to be able to calculate their position on the earth.

Recently, the Royal Observatory has become a museum for the accomplishments of astronomers of the past, housing astrological instruments and time pieces of the past, most notably the original telescope of John Flamsteed.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 27 March 2003

You can visit the [homepage](http://www.rog.nmm.ac.uk/) <http://www.rog.nmm.ac.uk/> of the Royal Observatory Greenwich for more information regarding exhibits and operational hours.

Saving wetlands for wildlife and people

London Wetland Centre



Located on 40 hectares of land near the busy South Circular Road, the Wetland Centre provides haven for many rare species.

The Wetland Centre is the home to over 480 different species of insects plants and animals, in 14 different wetland habitats modelled after global locations such as: New Zealand, South East Asia, and South America. With a variety of observation points, visitors are able to watch as birds fly into the reserve.

The Wetland Centre is one of nine wetland reserves maintained by the Wildfowl and Wetlands Trust.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 14 April 2003

Visit the [London Wetland Centre Homepage](http://www.wwt.org.uk/visit/wetlandcentre/) <http://www.wwt.org.uk/visit/wetlandcentre/> for the regular Reserve Report on recent sightings and for directions.

Rain or shine the game will go on. . . .

The New Wembley Stadium



The same construction firm that developed Stadium Australia for the 2000 Olympic Games is currently at work in Wembley constructing a stadium that will bring football into the 21st century. Multiplex Constructions is responsible for the design and construction of the overall project.

In September 2002 the old Wembley stadium was torn down using the largest mechanical shearer, specifically built for the demolition of the stadium. Now in the spring of 2003, the old stadium has been completely demolished, and the process of piling has begun. Piling is when a column of wood, steel, or concrete is driven into the ground to provide support for a structure, which also retains the earth and prevents seepage.

The building of the stadium has a projected cost of £757m by the time the stadium opens in 2006. Perhaps the most amazing and impressive part of the design for the new stadium is the retractable roof. This 7 000 tonne roof (the weight of 78 double decker buses) will be supported by a steel arch, which when completed will be seen across London. The roof will become the longest single roof structure in the world. The arch removes the need for supports assuring that all 90 000 seats have unobstructed views. When completed this stadium will be a structural accomplishment that is dedicated to the sport of football, as well as the reputation of Wembley itself.

Submitted by: Sarah Doherty (Worcester Polytechnic Institute), 28 March 2003

To look at the [Official Site of Wembley Stadium](#) go here.

To see the [daily view](#) of construction progress on the stadium look here.

Look at an up to date [photo diary](#) of construction on the stadium so far.

To see Multiplex Construction's [specifications](#) for Wembley Stadium.

Check out the [future](#) of Wembley Stadium.

The Sole Survivor

Cutty Sark



In 1869 the clipper Cutty Sark was launched. Built to be one of the fastest and most prominent ships in the China tea trading industry, the Cutty Sark has overcome shadows and doubts to become the sole surviving tea clipper. The preservation society decided to put the ship in dry dock in 1954 – a feat since the society only had one ship in the United Kingdom on which to model dry docking. It was decided that the ship would be docked on a concrete plinth and remain permanently in Greenwich.

The ship was designed by Hercules Linton, a partner in the Dumbarton firm of Scott & Linton. The Clipper Ship weighed in at 963 tons, (a little over the weight of one hundred double decker buses), yet was built to be the fastest ship in the tea trade industry. Now the Cutty Sark is a tourist attraction like any other has to comply with building and fire regulations. So how exactly does a historical society go about preserving a ship while making it safe for visitors to walk about as well as leave in case of an emergency?

The Cutty Sark was one of the first large ships that was restored and fitted with new built-in facilities matching the original interior. For example the fire escape was built into the ship's hull to appear as if it was part of the original design. Other restoration aspects are the stairs and doorways which were widened and built at a more convenient angle to avoid the original steepness. All of this was produced to meet the needs of the visiting public.

Submitted by: Sarah Doherty (Worcester Polytechnic Institute), 28 March 2003

For information on visiting the [Cutty Sark](#) look here.

To learn more about the [original design](#) of the Cutty Sark.

To learn more about related historic ships go to [Schoonerman](#).

For more information about the [modern technology of the cutty sark](#) look here.

Design of the year award

Design Museum



The Design Museum for the first time is going to give away a national award for the UK-born or based designer who made the biggest contribution to design in the past year.

One of the competitors is Jonathan Ive, a British native and vice president of industrial design at Apple. Since his arrival at Apple, he and his team have developed fabulous products such as the iMac, PowerBook G4, iBook, and the iPod MP3 player.

One of his products is the PowerBook G4 notebook with its amazing 17-inch display. It is the world's first 17-inch portable computer with a resolution of 1440 by 900 pixels for good clarity. This machine was designed with aluminum outer skins that are laser-welded and it is enclosed with aluminum alloy. The PowerBook is only 1 inch thick and weighs 6.8 pounds. It features a lightweight, internal magnesium frame for superior stiffness and shock resistance. The hard drive is rubber mounted to the magnesium frame, providing additional protection in the inside.

You can visit the Design Museum and vote for the designer who should win the design of the year award.

Submitted by: Josevan Vallejo, Worcester Polytechnic Institute, 27 March 2003

To get more information on the exhibitions that is on display please visit the [Design Museum](#) Web site.

To read more about the 17-inch PowerBook G4 notebook please visit the [Apple](#) Web site.

Firepower

Royal Artillery Museum



Firepower is a museum that displays the artillery and equipment that have been used throughout the years, from the first explosively propelled arrow, to modern missiles with computer guidance and intricate engineering.

The Museum

The Firepower display is located at the Royal Artillery Museum. A video shows what it feels like to be a gunner during wartime. Following the video, there's the History Gallery where there's a display of the artillery of the past from bows and arrows to the latest technological weapons at the beginning of the 20th century.

Science at war

The gallery shows the chemistry of gun powder and how practical solutions were developed to create the different types of weapons. Next comes the Real Weapon Galley which explains the science of ammunition with hands-on equipment to experience scientific theory in action. Then there's the Gunnery Hall which displays equipment that was used by the British Army during the 20th century.

The Abbot FV533

Once in the Gunnery Gallery, there's a display of the "Abbot" FV533. This is a 105mm self-propelled gun that was used in 1976 during the Cold War. The gun is mounted in a fully rotating turret with powered traverse through 360 degrees. The inside of the turret had positions for 3 crew members, a gunner seated at the right front, a commander immediately seated behind and a loader behind the main gun.

Submitted by: Josevan Vallejo, Worcester Polytechnic Institute, 03 April 2003

To get more information on the galleries and displays please visit the [Firepower](#) Web site.

To find out more on the [Abbot FV533](#) please visit the link.

The Wheel House of the Mills

Renewable Energy in the Urban Environment



The Wheel House at the Merton Abbey Mills has been on that site for hundreds of years. It was initially used to grind corn and later to power machinery used in the dyeing and printing of fabrics. After extensive renovations, the Wheel House is now the only working waterwheel in London.

About RENUÉ

Renewable Energy in the Urban Environment (RENUÉ) is an environmental charity which involves the local community in the idea of sustainable building practice. RENUÉ has installed small scale renewable energy demonstrations to train local practitioners on how to incorporate renewable energy sources into buildings.

The Wheel House was refitted recently as part of a RENUÉ demonstration of a small scale power generation plant. The water wheel turns a potter's wheel and generates 0.6 kilowatts of electricity for lighting the wheelhouse and recharging Merton Abbey Mills' electric vehicles.

How does the Wheel House work?

In order for the water wheel to generate electricity and to charge the batteries of the electric vehicles, the water wheel must turn an electric generator. When the water wheel turns on its axle, the teeth on the wheel mesh with the gear wheel. The gear wheel, which is much smaller, then rotates 10 times as fast as the water wheel. The gear wheel shares an axle with a pulley wheel which is attached to the generator via a fan belt. The generator is then turned at 720 RPM which is enough to generate the electricity to power approximately 10 incandescent light bulbs.

Submitted by: Josevan Vallejo, Worcester Polytechnic Institute, 11 April 2003

Links:

To read more about [RENUÉ](#) and its projects please visit their Web site

To see more pictures on the [Water Wheel House](#) and the Merton Abbey Mills please follow this link

London Planetarium

Digistar II Star Projector



The London Planetarium is right next to Madame Tussaud's Wax Museum. It is the only planetarium in Europe to have the world's most advanced star projector.

The Digistar II Star Projector weighs approximately 1/2 ton and the cost of the technical refit including the projector was 1 million pounds. Moreover it contains a database of the 3-D positions of 9094 stars in the Milky Way. The 3-D capability of the Digistar means that it can create the sensation of travelling through our galaxy by accurately depicting the shift in position of the stars as if we were approaching them.

The Digistar can be used to travel backwards or forwards in time, to see how the stars were arranged in the sky up to a million years in the past or future. In fact the Digistar can show any image consisting of dots and lines and project it onto the dome in 3-D dimensions.

Submitted by: Josevan Vallejo (Worcester Polytechnic Institute), 21 March 2003

Links:

For more information on the planetarium please visit the [London Planetarium](#) Web site

For more information on the projector please visit the [Digistar II Star Projector](#) Web site

The technology and art of war

Imperial War Museum



The Imperial War Museum shows the history of the many wars and battles that occurred in the 20th century including experiences of wartime life in Britain.

Inside the Museum

In the main atrium there is a large display of fighting vehicles and firearms showing the types of technology that were used in the past wars. The exhibits range from different aircraft designs that were used in World War I to tanks that were brought to the museum from World War II.

There is also the Secret War Exhibition which reveals how special communications technology has been used to gather intelligence and break top-secret codes. This includes an original German Enigma cipher machine which it was used to send secret messages during WWII by sending an electric current from the keyboard through a set of rotors and a plug board to light up the code alphabet.

M4 Sherman V Tank

In the large military equipment exhibition, there is an M4 Sherman V tank. Although it was an American-built tank, it was British troops that nicknamed it after the controversial US general. The M4 was used for the first time in the Battle of El Alamein by the British in 1942 and it was the most widely used Allied tank in World War II. It could only go at 40 kph, but its 17-pounder gun made the tank powerful enough to fight against the German tanks.

Although powerful and proven, its high center propeller shaft gave the hull a tall profile. Suspension was a rugged and simple design, known as VVSS (Vertical Volute Spring Suspension), with three units (or bogies) on each side, and each with two road wheels. The transmission was 5-speed forward plus reverses. Early production M4's had a 3-piece front transmission cover, and a cast one-piece steel turret mounting a 75mm main gun.

Submitted by: Josevan Vallejo, Worcester Polytechnic Institute, 10 April 2003

Links:

If you would like to see a 360 degree view of the large exhibit gallery at the [Museum](#) please click on the link

Visit this Web site to find out more about the [Sherman Tank](#).

Technology to thwart counterfeiters

The Bank of England Museum



The Bank of England remains one step ahead of counterfeiters through technological advances in printing and computer graphics.

The origins of cash

The Bank of England was founded in 1694 in order to be a debt-manager for the country. In planning, it was decided that monies in the bank would be accounted using three methods. Of these three methods, the Running Cash Note became the most popular due to three important words found on the note. 'Or the Bearer'. These words allowed notes from the bank to be passed to other people as a method of payment, marking the birth of cash.

Banknotes

Originally, bank notes were hand written, and signed by a staff member of the Bank of England, but soon counterfeiting became a problem for the Bank, and it needed to develop ways to combat counterfeiting of bank notes.

The Museum has a collection of bank notes dating back to the first note issued, and these advances become evident as one moves through the collection. Cash today features a number of security measures, some of which include:

- **Cotton paper with watermarking and metallic strip:** Each note is made with a specific type of paper that includes cotton. This gives the bill a unique feel to other types of paper. During the process of making the paper, a watermark is added to the paper as well as a metallic strip to help prevent counterfeiters from making a false medium.
- **Dyes and printing:** The printing process uses over 70 dyes unique to the Bank of England, and mixed specifically for the use on bank notes. The dyes are used in highly detailed printing presses that, because of the special dye, create the unique feel of a bank note.
- **Computer-aided graphic design: The background pattern, or guilloche, is designed using advanced computer graphics techniques, making the pattern impossible to duplicate by hand, and extremely difficult to recreate using computers.**

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 25 April 2003

You can visit the [Museum's homepage](#) to learn more about the collections of the Museum, or click [here to learn more about the history of the Bank of England](#).

The great science storehouse

Science Museum



At the Science Museum visitors can see everything from a singing bridge made of glass to modern jet fighter. The museum, which will celebrate its sesquicentennial anniversary in 2007, did not initially start as a museum dedicated to science, but today it is difficult to imagine it any other way.

The Collection

The Museum's collection includes some 300 thousand objects, ranging from the tiniest Silicon Integrated Circuits to full sized aircraft and rockets. You can see the tools of primitive people next to the most modern scientific instruments; the Museum's collection spans the entire history of science and technology.

Virtual Exhibitions

In order to make their collection more accessible to the public, the museum has a number of online exhibitions. These online exhibitions provide the user with more detailed information than is generally available in the Museum, as well as fun interactive environments in which to learn.

The museum is truly overwhelming; there is no way to see everything in one day. If you are interested in any area of science or technology, you should definitely visit the Science Museum.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 24 April 2003
Try out the Museum's Online Exhibitions

For more detailed information about the museum, check out their [Homepage](#)

Flood your senses in the aquarium

London Aquarium



The London Aquarium is one of Europe's largest and most spectacular displays of aquatic life. It features 45 exhibits showcasing 30 000 specimens including over 350 species of fish, invertebrates and marine life from different zones around the world.

Sampling life from the oceans

Visitors are immersed in a stunning display of hundreds of varieties of fish and sea life from around the world including stingray, piranha, sea scorpions and cuttlefish, many of which have never been seen before on these shores. The two main, vast exhibit tanks descend three floors and contain 1 million litres each of filtered and treated water. These are devoted to the Atlantic and Pacific Oceans. The Atlantic Tank features mackerel, bream, bass, conger eels, dogfish, plus many more fish species and marine life, while the Pacific tank contains sand tiger and brown sharks, nurse sharks, groupers and jacks.

Conservation and breeding

The aquarium also operates a conservation and breeding programme run by a team of specialist biologists where they carry out all animal husbandry. This involves preparing the marine diets, monitoring health and animal behaviour as well as all out breeding programmes and undergraduate research.

Submitted by: Josevan Vallejo, Worcester Polytechnic Institute, 24 April 2003

Visit the [London Aquarium](#) Web site for more information. See the sharks swimming around in the aquarium on the web cam.

Inside the head of Sigmund Freud

Freud Museum



Preserved by his daughter after his death, the Freud Museum allows you to examine the home of the father of psychoanalysis.

The year in London

Escaping Nazi Germany after the annexation of Austria in 1938, Sigmund Freud moved to London and died a year later. The museum is decorated with the many antiques that Freud collected during his life, but most notably, the museum houses Freud's personal collection of books and his psychoanalytical couch, where patients would have their sessions. The Museum operates a library of Freud's collection for research purposes only.

Psychoanalysis

Psychoanalysis is the practice of treating emotional or mental disorder through therapeutic talks with a psychoanalyst. The purpose of these talks is to create a forum where the logical filtering of the thought process is removed and thoughts on the mind are expressed. This sets the analytical stage and allows progress to take place as the patient comes to grips with himself on an intellectual and emotional level. Freud has many followers, the first of which was his youngest daughter Anna, who is known for her work in the field of child psychoanalysis.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 17 April 2003

The [Freud Museum Web site](#) has information on operating hours and directions to the Museum, or you can click to [the Freud Museum Online Research Centre](#) for information regarding the Museum's library.

An awesome structure

Lloyd's London



At first sight the Lloyds building of London looks like a strange and alien-like building. Yet when looked upon at a closer distance it is quite an awesome structure. The building itself appears to be from a new age science fiction film, with it's steel exterior, and guards at all the entrances, the building itself emits an aura of power and strength, much like the corporation it was designed for.

Architects and engineers

The Lloyds building designed by Richard Rogers Partnership in conjunction with Ove Arup and Partners, is said to have brought London Architecture to a new level of modernism.

Completed in 1986, the building itself is termed a celebration of steel and glass; to which was evidence of "high tech" architecture, in the 1980's. The building is constructed of 12, 16 metre wide concentric galleries overlooking a central atrium. There are 6 towers supporting the main structure and containing the service elements (lifts, refuse chutes, and air conditioning) however these towers are housed outside of the building so that interior space is maximized, as well as to allow for easy, unobtrusive access to the service elements.

The office itself was designed not in the usual office style, but in more of an open-plan style so that co-workers could view each other, and the city through the triple glazed glass.

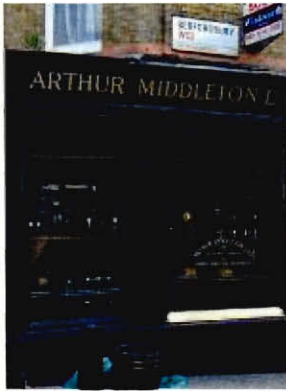
In keeping with the post-modernist era, moving forward into the future, while treasuring elements of the past, the main atrium of the Lloyds building houses the famous Lutine Bell. For a more spectacular view visit the Lloyds building at night to take in the full effect of this architectural feat illuminated against the city skyline.

Submitted by: Sarah Doherty (Worcester Polytechnic Institute), 17 April 2003

A number of Web sites allow you to learn more about: [Lloyds London](#); the role of [Ove Arup Partners](#) in constructing the building; the work of the [Richard Rogers Partnership](#) and [photos of the building during construction](#).

Antique scientific instruments

Arthur Middleton Antiques



Not only a special science shop but also the source of props for stage and film such as the globe, armillary spheres and astrolabes in Professor Dumbledore's study in the film *Harry Potter and the Chamber of Secrets*

The Arthur Middleton shop is close to Covent Garden. The store has a wide selection of instruments from the history of laboratory science, navigation, astronomy and many kinds of technical measurement. All the items in the shop are authentic originals.

To visit the store, customers have to call and make an appointment. The store only admits serious buyers.

Submitted by: Josevan Vallejo, Worcester Polytechnic Institute, 17 April 2003

Visit the [Arthur Middleton](http://www.arthurmiddleton.com) Web site to see what of instruments are in the shop.

The curvilinear tower in the centre of London

Swiss Re Headquarters



The Swiss Re Headquarters building has a fantastic architectural design which uses its aerodynamic form to assist natural ventilation to create an environmental progressive working space.

The design of the building

The design fulfils Swiss Re's brief to create a high quality headquarters building which optimises the local environment both for the occupants and the surrounding urban spaces.

The building is being constructed by Skanska Construction company in conjunction with the architects Foster and Partners. The 180 metre tall tower will be completed by the end of 2003.

The key feature of the design is the diagrid, which is a grid of diagonally interlocking steel elements makes the building a highly efficient structure. Overall, nearly 10,000 tonnes of steel was used to make the building's frame, of which 2400 tonnes was used to build the diagrid and its 360 connecting nodes. By using extensive 3D computer modelling, the design company Ove Arup defined the required steel sizes and precise geometry for this unconventional building. The form of the building makes the wind flow around its face, minimising wind loads on the structure.

Submitted by: Josevan Vallejo, Worcester Polytechnic Institute, 17 April 2003

Two Web sites will help you to learn more about the [construction company](#), the project, the building and its design.

Historical clocks still ticking

Clockmaker's Museum



The Clockmaker's museum houses the oldest collection of clocks and clock making manuscripts in the world.

The Clockmaker's Museum was founded in 1813 by a group of London clockmakers to answer the need for a clockmaker's guild. The museum houses ancient manuscripts on clock making from the time of the Museum's inception. The collection of time pieces began a year after the formation of the collection in 1814, making it the oldest collection of exclusively clocks, watches, and marine time keepers.

In the Museum you can view of 600 English and European watches, 30 clocks, and 15 marine time keepers, ranging in dates from c.1600 to c.1850. These marine time keepers were important in the navigation of the oceans, and were required to be precise in order to keep sailors on course.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 29 April 2003

Click here for more information on the [Clockmaker's Museum](#), or here for [samples of museum pieces](#).

Local garden houses medicinal plants

Chelsea Physic Gardens



The Chelsea Physic Garden contains living specimens of medicinal plants used all over the globe.

The Chelsea Physic was founded in 1673 as the Apothecaries Gardens with the purpose of training apprentices of doctors. The specimens housed there were originally used as prototypes for the apprentices to identify the healing plants. At the Gardens today, there are over 5000 species of plants in the seven gardens. The Pharmaceutical Garden has plants that are proven to have medicinal value in modern medicine, such as the Aloe Vera used in lotions for skin moisturizer. The Garden of World Medicine has specimens that are used across the world by indigenous peoples in their native lands. The Perfumery Garden contains specimens that are used the perfume industry in their fragrances. Other gardens include culinary herbs, plants used in dyes and fabrics, and a garden exclusively for poisonous plants. The Garden also houses a seed library to catalogue the variations found in plants.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 29 April 2003

Follow this link to visit the Chelsea Physic Garden [homepage](#).

Appendix D Where Science is Done Entries

Opening up science to the public

The Darwin Centre



The Darwin Centre is an internationally respected institution for scientific research. Uniquely, the Centre is also a major public attraction. Tours are provided twice an hour through the laboratories of the Centre, and the public is encouraged to speak with scientists at free talks and discussions that occur at least daily.

The Centre houses more than 70 million specimens, including some collected by Charles Darwin himself during his expedition in HMS *Beagle*. The magnificently preserved specimens include many plants and animals that have been stored for hundreds of years. The public has currently seen only 1% of the Centre's collection; by 2007, the Centre hopes to have up to 80% of their collection available to the public.

Charles Darwin published his most famous work, *Origin of the Species*, for non-scientists. In that spirit, the Centre seeks to bring science to the public, providing an opportunity that is truly unique in the scientific world. It is obvious when taking the tour that the Centre is very much a real working research laboratory. More than 350 Scientists and researchers work at the Centre, and if you stand around long enough, you will be sure to meet a few.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 31 March 2003

Check out the [Darwin Centre Web site](#) for more information about the Centre.

For more information about Charles Darwin, try [About Darwin](#)

Breathing easier for £5 a day

Congestion charging



Following the lead of Melbourne and Singapore, London adopts congestion charging to alleviate traffic problems.

Caught on camera

As part of the Mayor's transportation strategy, the City of London has implemented a massive system to charge driver's in 21 square kilometres of Central London £5 for entering the enforcement zone. Using over 800 CCTV-type cameras at over 203 enforcement sites, the TfL captures an image of your automobile, in both black and white and colour, and processes the image for enforcement of this charge.

Data processing

The processing of the images occurs on a cluster of commercially available computers, in order for prompt servicing in the event of failure. This group of servers is called the Automatic Number Plate Recognition (ANPR) system, and has a success rate of 90 percent.

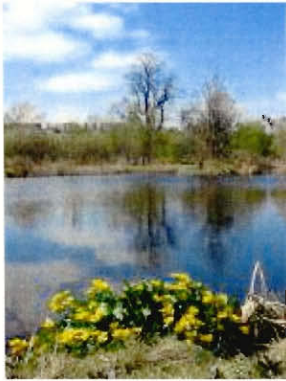
The system has been designed to handle over a quarter million automobiles daily, with each video clip at approximately 100KB in size. With all the cameras recording, this results in a staggering 21 terabytes of information on a daily basis. Once captured, the ANPR system chooses the most suitable frame to extract your number plate from, and sends it to the billing database in order to confirm payment for that day's charges.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 04 April 2003

See how [congestion charging](#) fits with the Mayor's current transport strategy or view the statistics and details on the [camera enforcement infrastructure](#).

Conservation-based research

Wildfowl and Wetlands Trust



The Wildfowl and Wetlands Trust is committed to the preservation of the natural habitats of threatened species

The Wildfowl and Wetlands Trust has carried out research for over fifty years. In the field of ecology its studies fall under three broad categories: monitoring, recording baseline information about populations, and providing specific details about species to address concerns that may face them.

The trust has a team of just 18 scientists that provides information on wildfowl to other conservation organisations, including the Wetland Bird Survey and the British Trust of Ornithology. The research group has three departments: the Threatened Species department, the Wetland Advisory Service, and the Interpretation department, which is primarily in charge of the planning of wetland reserves. They report findings in their yearly journal, *Wildfowl*.

Submitted by: Anthony Tiscia, Worcester Polytechnic Institute, 10 April 2003

Find out more about the research of the Wildfowl and Wetlands Trust on their [research home page](#).

Planning for a better environment

Brent Council Environmental Department



Wembley Stadium is going to be an architectural and economic achievement for the Borough of Brent. Those responsible for measuring the environmental, social, and economic impacts of the stadium work for Brent Council.

When asked, Ken Hullock, of the planning division in the environmental department, said his favourite project that he had been involved with at the Council was the Wembley Stadium regeneration.

The Planning sector carries out the duties of the 'local planning authority'. The Planning department is responsible for monitoring developments, in highways, housing, business, and traffic. Perhaps most importantly they preserve and maintain open spaces, and older buildings. Working closely with the public to ensure that the environments of the residents are maintained, the Planning Services department of the Council enforces the Town and Country Planning legislation to control the use of land or buildings and development in the Borough.

Submitted by: Sarah Doherty (Worcester Polytechnic Institute), 11 April 2003

Visit this web site for more information about [the Borough of Brent](#).

R&D for better health care

Saint Thomas Hospital



St Thomas Hospital has a long history of medical innovation and progress dating back to the twelfth century.

The hospital is part of the Guy's and St Thomas' Hospital NHS Trust with a budget of over £30 million for research and development.

Some of the research has hit the headlines including work in the fields of intensive care, stem cell research and work to explore maternal morbidity.

The Trust has worked with others in London to identify 20 'Priority and Needs' programmes of research. The Trust has strengths in key fields such as cardiovascular medicine, children's health, stroke and cancer.

Other important areas of expertise tackle local health issues such as sexual health, women's health, oral health and inequalities.

The Trust also has international research strength in areas such as genetics and asthma and allergy.

Submitted by: Josevan Vallejo, Worcester Polytechnic Institute, 28 April 2003

Find out more about the work of the hospital at the web site of the [Guy's and St Thomas' Hospital NHS Trust](#).

Protecting people from infection

Health Protection Agency (HPA)



Current world events have everyone questioning whether or not the containment of SARS (Sudden Acute Respiratory Syndrome) is being adequately enforced.

However in London, the Health Protection Agency was formed 1 April 2003; 'to provide an integrated approach to protecting public health and reducing the impact on human health from infections, poison, chemical, and radiation hazards'.

SARS is just one of many infectious diseases that the Agency studies. So far the HPA and WHO (World Health Organisation) have found that SARS is most likely a virus rather than a bacterium. While the pathogen (cause) of SARS has not been determined, the Agency releases safety publications, while they continue to research the root of the illness.

The HPA also promotes awareness about many other infectious diseases such as HIV and Malaria. With the help of six other organisations the Health Protection Agency will inform professionals and the public in England and in Wales about prevention measures, and medical advice regarding infectious diseases around the world.

Submitted by: Sarah Doherty (Worcester Polytechnic Institute), 25 April 2003

To learn more about the [Health Protection Agency](#) from its web site.

Forging into the future with the support of fellow engineers . .

Institution of Electrical Engineers



Composed of 130,000 men and women, the Institution for Electrical Engineers is a registered charity devoted to promoting electrical, electronic and manufacturing science, and engineering throughout Europe. This institution is by far the largest in Europe and one of the oldest; founded in 1871.

The IEE represents from students to highly distinguished members of the electrical engineering profession, as well as setting standards for qualifications for all levels of electrical engineering. In education the IEE accredits degree courses related to electrical, electronic and manufacturing science and engineering, at universities and colleges worldwide. As well as setting the standards for the professional members of this society. The IEE is the voice of the electrical engineering profession, heard round the world.

Based in London, the IEE hosts a variety of events mostly for professionals, but some are educational events listed for the public. The IEE distributes scholarships and grants to students studying electrical, electronic, manufacturing science and engineering, to further promote the study of electrical engineering. If you are interested in electrical, electronic, and manufacturing science and engineering look at the below links for further detail.

Submitted by: Sarah Doherty (Worcester Polytechnic Institute), 17 April 2003

To learn more about the [IEE](#) click here.

Digging to find the truth

Archaeologists at the palace



Forget the Haunted Hall, the real mystery at Hampton Court palace is one that has haunted architects and historians for almost five centuries.

The History

Hampton Court Palace, which rivalled the royal palaces of the day with its splendour, was originally built as a residence for Cardinal Thomas Wolsey, but in 1528, Wolsey was forced to surrender the palace to Henry VIII. Soon after taking control of the palace, Henry began a decade long remodelling project that almost completely obscured the design of the original palace.

The Mystery

The puzzle of the palace's original design has troubled historians and architects like Jonathan Foyle for many years. What did the original palace look like? Nobody knew. There were no design plans, no drawings, nothing. All that they had were written descriptions of the magnificence of the palace.

Foyle realized one day that several walls of the original palace seemed to form part of a complex geometric pattern. In order to test his theory of the palace's original design, he began a series of small archaeological digs inside the palace. In his digging Foyle uncovered remnants of the original Great Hall, the original kitchen floor, and a pipe which was used to supply water to the kitchen; all were apparently part of the original design, much to the surprise of some historians. Eventually, Foyle found that his hypothesis about the design had been correct, but more than that, he found that there is still much that is yet to be discovered about the mysterious palace.

Submitted by: A. Wallen, Worcester Polytechnic Institute, 28 April 2003

Engineering a mechanical future

Institute of Mechanical Engineers



An engineer is a problem solver. Some problems remain challenging and one of them is to explain to people what engineers do, and more specifically mechanical engineers. As the home to over 80,000 engineers worldwide, The Institute of Mechanical Engineers (IMECHE) aims to put this right. The Institute's vision statement is: "To create the natural professional home for all involved in Mechanical Engineering."

A wide ranging field

Mechanical engineers do not simply work on car engines or design dynamic systems to create a whole machine. This field of engineering can go from designing jet engines and nuclear power stations, to biomechanics. Biomechanical engineers design artificial replacement joints or limbs.

Careers in engineering

The professional institution helps anyone wanting to know how to become a mechanical engineer. The institution offers chartered membership to those having completed their degree with two years working in engineering practice, and another two years of professional responsibility.

The most impressive avenue is the mentor programme, where graduates can achieve chartered status as fast as possible through close relations with chartered members and IMECHE itself.

Submitted by: Sarah Doherty (Worcester Polytechnic Institute), 11 April 2003

Learn more about the [Institution of Mechanical Engineers](#) from its Web site.

Meeting transport needs at the expense of the locals

North Circular Road



The North Circular Road in the Borough of Brent has been a concern for many residents, as well as the local Council. The Council has been finding out the extent of the impact on residents and the environment from this busy and dangerous road.

The North Circular Road connects Brent to London and the rest of the country. On a good day, Heathrow can be reached by car in twenty minutes. However convenient this may sound, the road is having a huge impact on the residents who live mere a pavement away from what is becoming a busy motorway.

Scientists have been analyzing environmental, health, safety, and traffic data of the road, in order to aid the Council in finding a long term solution, as well as what short term measures can be taken to alleviate some of the problems.

Many pollutants that originate from the burning of motor fuels can be harmful to humans especially children and the elderly. One short term solution already proposed by the Brent Council is to establish Air Quality Management Areas. These are areas south of and next to the North Circular Road.

The road is also the scene of many accidents, since parking is limited, and cars are travelling at high speeds it is very dangerous to pull in and out of residential driveways. In a survey conducted by the Council, many residents reported major accidents at least once a week, and recently two in one week on the road itself.

The council is working hard with the project team as well as the residents of Brent to find a solution to the problem of the North Circular Road.

Submitted by: Sarah Doherty (Worcester Polytechnic Institute), 11 April 2003

Visit other web sites to find out about the [the Borough of Brent](#) and [Brent Council](#); [fossil fuel pollution](#)

Appendix E Events Entries

Feathery dinosaurs show links to modern day birds

The Natural History Museum



Until now, the origin of birds was a mystery, and the link to dinosaurs was mere speculation. New fossil evidence is about to change all of that.

Date: 18 July 2002 to 05 May 2003

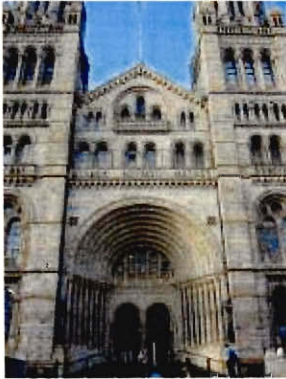
Venue: Cromwell Road, London

Originally found in the northeast corner of China, palaeontologists, with the help of local farmers, have found new evidence that brings them closer to the link between the deadly, land-bound predators of long ago and the free-flying birds of today. In this exhibit, one can see rare fossils that clearly show the remains of dinosaurs, as classified by palaeontologists, with what appears to be feathers surrounding the bone structure. As visitors pass through the exhibit they will see four fossil records of four different species of dinosaurs as they slowly evolved into birds. The link between the dinobirds and modern day birds is emphasized in the sweeping wrist of the dinobirds. This wrist is what is responsible for the flight of birds, which the exhibit demonstrates effectively with scientific footage of scientists studying this evolution. For years, scientists have been whittling away at the origin of birds, but this new evidence on display at the Nature History Museum will be sure to be a large piece of the puzzle.

Visit the Dino Bird's [homepage](#) for information about the exhibit, or learn more about the [debate](#) about the history of modern birds.

A showcase for scientists and their work

The Darwin Centre



Shedding their lab coats and protective goggles, Darwin Centre Live makes scientists and their work more accessible to the public.

Located at The Natural History Museum, the Darwin Centre is the living part of the museum, employing over 350 researchers and has a catalogue of over 70 million biological specimens. With such a wealth of knowledge located in one wing of the Museum, the Darwin Centre offers visitors to the museum, as well as Internet visitors via scheduled broadcasts, the opportunity to learn about the research that is being conducted at the Darwin Centre. Selected scientists are scheduled to present their research in an interactive environment, allowing for comments, questions, and the occasional debate with experts in a variety of fields. Topics change at each show time and are posted on the Darwin Centre's Web site.

Find out more about the Darwin Centre at its [homepage](#) or go to the [schedule of events](#).

Exposing science.. and yourself

Naked Science at the Science Museum



Today more than ever, science is part of our everyday lives. No matter where we go, science is there, often transparently integrated into our surroundings. With the level of involvement that science has in our everyday lives, it is amazing how little most of us are involved in science. The Science Museum is trying to change that through a series of Events called *Naked Science*.

Exposing Science to the Public

Through a series of publicly accessible events that will last throughout 2003, the Science Museum will bring science to the public. *Naked Science* is the museum's way of getting the public actively involved in the science that affects us all. Some of the events will happen at the Museum itself, but the venues may be varied.

With topics that range in scope as much as the exhibits in the museum itself, the Museum hopes to attract a diverse range of people to their events. Some of the events may be fun and whimsical, while others may be sobering and serious, but they always promise to be interesting.

Expose Yourself

Naked Science is not just about passively listening to a scientist or researcher speak, it is about engaging yourself and actively participating. You are not there for them, they are there for you.

Here is the full [Naked Science Programme](#).

The Naked Science Events are sponsored by [The Museum of Science](#).

The magic of 007

James Bond Exhibit



Bond, James Bond. We've all seen the movies or at least heard of 007. But what we don't know is that there is such amazing technology behind the scenes of these movies. The National Museum of Science and Industry is featuring the James Bond exhibit until April 27, 2003.

Date: 04 April 2003 to 27 April 2003

Venue: National Museum of Science and Industry

Featured at this exhibit are the drawings and plans of gadgets used in the James Bond films. For example Rosa Klebb's lethal shoe. This exhibit answers many questions about the mystery behind James Bond films. How does the knife come out of the toe of the shoe? The shoe has a spring load in it that ejects the knife in order to use against Bond.

Models as well as drawings and plans are displayed to show the elaborate design process of constructing the often complex and diverse lairs for the villains in the James Bond movies, such as the Stromberg's under sea lair in the 'Spy Who Loved Me'. The whole exhibit features a range of technological discoveries to unravel the magic. Once you are done, you can go online and continue the Bond experience to test your knowledge of what you learned at the exhibit.

Find out more about the [National Museum of Science and Industry](#) and its [Bond Exhibition](#). Discover more about [Bond gadgets fact or fiction](#)

Imagine DNA 50

Photography competition



What does DNA mean to you? In conjunction with the BBC; the Wellcome Trust has created an opportunity for amateur photographers to celebrate the 50th year of the discovery of the double helix.

Date: 25 April 2003 to 30 June 2003

Venue: The Wellcome Trust, 183 Euston Road

Pictures can be anything symbolising how DNA has inspired you. You have until 30 June 2003 to enter the competition.

Look here for more details on [entering the contest](#).

Authentic artefacts raised from the seabed

Titanic: The Artefact Exhibition



Hundreds of artefacts from the RMS Titanic, recovered from almost 4 kilometres beneath the waves, will be on display when the Titanic Artefact Exhibition comes to the Science Museum.

Date: 16 May 2003 to 28 September 2003

Venue: The Science Museum

The story of the Titanic is perhaps one of the best known tragedies of all time. Deemed unsinkable by some, the great ship sank after colliding with an iceberg on her maiden voyage in 1912. Now, almost a century later, the Museum of Science will provide the public with a unique opportunity to see some of the artefacts recovered from the doomed liner.

The exhibit will not just be a showcase of artefacts however; it will be a totally immersive experience. Visitors will be able to walk through reproduction hallways and cabins, and even touch an 'iceberg.' Visitors will travel through the entire lifespan of the Titanic, from her conception and construction, to her sinking and the eventual recovery of pieces and artefacts.

What will be in the Exhibit:

- Reproduction first and third Class Cabins
- The actual ship's bell that rang out the iceberg warning
- A 2 tonne piece of the Ship's Hull
- An artificial iceberg that visitors can touch
- A look at some of the science and technology used to find and recover pieces from the ship
- A memorial gallery that tells the fate of every person on board the Titanic

Ticket Prices:

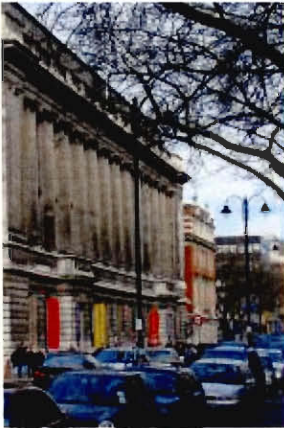
Adults £9.95

Children/Concessions £6.95

For more detailed information check out [Press Release for the Exhibition](#).

Boldly going where no film has gone before . . .

Imax cinema at the Science Museum



Watching films in theatres or homes is always an enjoyable activity. However what if you had a chance to jump into the film, to feel as if you are a part of the action, or delving into the human body. What if you had the chance to travel through your digestive tract, or into a world of computer animation? The London Museum of Science's IMAX or Image Maximum theatre allows you to do just that.

In a room with a screen 20 m high and 26 m wide it is easy to feel a part of the film. However it is technology and not just the screen that allows the film to come to life. With a combination of specially made projectors that run the same amount of frames as a normal projector (24) but nearly 4 times as many feet per minute as a 34 mm projector.

The sound system is unique as well, played on a DVD which controls the projector and the sound in a system called DTAC, (Digital Theatre Audio Control) which transmits sound through an amazing 11,600 watts of power.

And if that's not intriguing enough the camera in itself is impressive as well, not only does the IMAX camera only hold 3 minutes worth of film (13 reels for 40 minutes), but there is also a 3D camera as well which involves the audience even more. 3D cameras involve simultaneously running two films through polarized lenses spaced equivalent to that of your eyes (the interocular distance). Once the viewer puts on their polarized glasses the images are life like and right in front of your eyes.

To learn more about the [National Museum of Science and Insuustry](#) go here.

To obtain a [Schedule of IMAX films](#) featured at the Science Museum, look here.

To see whats behind [IMAX Technology](#) click here.

Take a look at how [3D Films](#) are made.

Appendix F Rating Bars

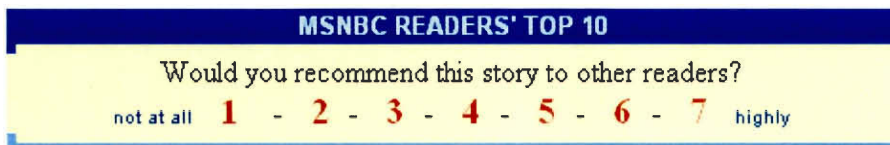


Figure F.1 The MSNBC Article Ratings Bar

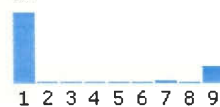
How would you rate the quality of this content?

1 2 3 4 5 6 7 8 9
Poor Outstanding

Tell us why you rated the content this way. (optional)

Submit

Average rating:
3 out of 9



443 people have rated this page

Figure F.2 Microsoft Developer Network Article Rating Bar