Cincinnati Museum Center Interactive Media

By

Joel Willis

Submitted to
the Faculty of the Information Technology Program
in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Science
in Information Technology

University of Cincinnati
College of Applied Science

June 2006
Cincinnati Museum Center Interactive Media

By

Joel Willis

Submitted to
the Faculty of the Information Technology Program
in Partial Fulfillment of the Requirements for
the Degree of Bachelor of Science
in Information Technology

© Copyright 2006 Joel Willis

The information in this document is proprietary and may not be reproduced or distributed in whole or in part without the permission of the owner.

___________________________________________________ __________________
Joel Willis        Date

___________________________________________________ __________________
Dr. Sam Geonetta, Faculty Advisor     Date

___________________________________________________ __________________
Patrick C. Kumpf, Ed.D. Interim Department Head   Date
Table of Contents

Table of Contents i
List of Figures ii
Abstract iii

1. Statement of Need 1
   1.1 Cincinnati Museum Center 1
   1.2 Cincinnati Museum Center’s Web Site 1
   1.3 Need for Interactive Media 3
2. Project Description and Intended Use 4
   2.1 Solution Description 4
   2.2 User Profiles 5
     2.2.1 Web Site Visitor 5
     2.2.2 Web Site Administrator 5
3. Design Protocols 6
   3.1 Organizational Scheme 6
   3.2 Branding Standards 6
   3.2 Branding Standards 7
4. Deliverables 8
5. Proof of Design 9
   5.1 Interactive Media Application Design 9
   5.2 Navigation 10
   5.3 Virtual Tours 11
   5.4 Flash Detection 12
   5.5 Image Viewer 13
   5.6 Interactive Games 14
     5.6.1 Museum of Natural History and Science: The Cavern “Bat Game” 14
     5.6.2 Children’s Museum: Energy Zone “Ball Game” 16
     5.6.3 Cincinnati History Museum: From Settlement to 1860 “Puzzle Game” 18
6. Development 19
   6.1 Project Schedule 19
   6.2 Project Budget 22
   6.3 Deviations from the Baseline 24
7. Testing Procedures 24
8. Conclusion/Recommendations 25
9. References 26

Appendix A – Virtual Tour Scripts 28
   A.1. Museum of Natural History and Science 28
     A.1.1 All About You 28
     A.1.2 Nature’s Trading Post 29
     A.1.3 Cincinnati’s Ice Age: Clue Frozen in Time 29
     A.1.4 The Cavern: A World Without Light 30
   A.2. Museum of Natural History and Science 31
     A.2.1 Cincinnati Goes to War: A Community Responds to World War II 31
     A.2.2 Forming a New World: Cincinnati's Machine Tool Industry, 1850-1930 32
## List of Figures

**Figure 1:** Cincinnati Museum Center showcased exhibits  

**Figure 2:** Screen shot of Kid’s Town featured exhibit Web page  

**Figure 3:** List of interactive media  

**Figure 4:** Use Case Diagram  

**Figure 5:** Color scheme  

**Figure 6:** Design elements  

**Figure 7:** Interactive Media application screen shot  

**Figure 8:** The exhibit links for the Museum of Natural History and Science navigation  

**Figure 9:** Video controls  

**Figure 10:** Flash detection message for users with Flash Player versions 7 and below  

**Figure 11:** Flash detection message for users with Flash Player versions 6 and below  

**Figure 12:** Image Viewer application—first four images  

**Figure 13:** Image Viewer application after clicking next—last two images  

**Figure 14:** Bat Game introduction/instructions  

**Figure 15:** User playing the intermediate level of the Bat Game  

**Figure 16:** Ball Game introduction/instructions  

**Figure 17:** User playing Ball Game with five balls on medium speed  

**Figure 18:** Puzzle Game introduction/instructions  

**Figure 19:** User playing Puzzle Game  

**Figure 20:** Baseline task schedule  

**Figure 21:** Actual task schedule  

**Figure 22:** Detailed list of project resources and their associated costs  

**Figure 23:** Assigned resources by task and actual/baseline costs  

**Figure 24:** Bat Game win message  

**Figure 25:** Bat Game lose message  

**Figure 26:** Ball Game win message  

**Figure 27:** Ball Game settings selection screen  

**Figure 28:** Puzzle Game win message
Abstract

The *Cincinnati Museum Center Interactive Media* application is an interactive, multimedia enhancement of the current Cincinnati Museum Center Web site. In order to achieve an optimum level of Web marketability for the Center, the Web site is designed to be visually stimulating, easily navigable, and contain interactive elements. The Interactive Media application provides 11 virtual tours, 12 dynamic photo galleries, and three interactive games. Interactive components showcase exhibits from all three museums.

The application was created using Active Server Pages (ASP) and Macromedia Flash technologies. The application is easily maintainable; advanced Flash ActionScript, integrated with ASP scripting, allows Web administrators to modify virtual tours and photo galleries by simply uploading and/or replacing files on the server. The addition of the application is seamless because it is a plug-in to the existing Web site, only requiring slight modifications to the showcased exhibit pages.
1. Statement of Need

1.1 Cincinnati Museum Center

Cincinnati Museum Center at Union Terminal is the central location for five major Cincinnati attractions: Cincinnati History Museum, Children's Museum, the Museum of Natural History and Science, the Robert D. Lindner Family OMNIMAX Theater, and the Cincinnati Historical Society Library. Cincinnati Museum Center is a non-profit organization, relying on personal and corporate donations for most of its income. Ticket sales are also important, and revenue from attendance helps support Cincinnati Museum Center’s educational, cultural, research, and collections programs and opportunities (3).

1.2 Cincinnati Museum Center’s Web Site

The importance of Web sites for metropolitan attractions has increased as the Internet has become the most used tool for accessing tourism information. For tourists visiting Cincinnati, as well as local individuals searching for unique entertainment, Cincinnati Museum Center’s Web site is the primary source of information regarding the attractions. Because of this prominence, the site is important to attracting donations and maintaining/improving ticket sales.
In addition to basic museum information such as location, operation hours, and a calendar of events, Cincinnati Museum Center’s Web site includes seasonal exhibit information as well as pictures and brief descriptions of four “showcased” exhibits from each of the three museums (3). A list of those showcased exhibits is shown in Figure 1. A screen shot of the Kid’s Town exhibit page from Children’s Museum is shown in Figure 2.

Ideally, a museum Web site should provide essential information, complemented by interactivity that makes the museum attractive to visitors from all over the world. In
order to achieve an optimum level of Web marketability, the site should be visually stimulating, easily navigable, and contain interactive elements.

1.3 Need for Interactive Media

Cincinnati Museum Center had a need to upgrade its site to include interactive elements. Museum Web sites thrive on the use of multimedia. Cincinnati Museum Center Marketing Communications Manager Michelle Padilla contended that the previous site did not show all that Cincinnati Museum Center has to offer. “Cincinnati Museum Center has so much to offer, and I think we are the perfect institution to start adding (modern multimedia technology elements),” said Padilla. Many of the exhibits have hands-on activities that cannot be represented by static content. Without displaying these activities, Cincinnati Museum Center may not have been attracting potential visitors.

History and science museum Web sites often face the challenge of presenting historical information in a modern way. “Science museums should, by their nature, be aware of technological developments and use these appropriately in a timely fashion” (2). In order to attract the most visitors, modern technology should be used to attract younger visitors without alienating traditional museum goers. The simple, static information displayed on Cincinnati Museum Center’s Web site is informative, but there was a need for some accompanying and complementing interactivity in order to attract the most visitors.

When addressing the need for interactivity, certain requirements needed to be met in order to meet the Cincinnati Museum Center’s guidelines for Web content:

- The addition of interactivity should in no way modify the existing site structure, design, layout, or textual information.
• Design standards specified by Cincinnati Museum Center’s Web site must be followed.

• All media must be appropriate and user-friendly for Internet users of all ages.

• The application must have as few system requirements as possible.

• All Web pages must be written in Classic ASP VBScript Web scripting language. The site is completely comprised of ASP pages, and the added pages should comply with those standards.

2. Project Description and Intended Use

2.1 Solution Description

The Cincinnati Museum Center Interactive Media application fulfills the Cincinnati Museum Center’s need for Web site interactivity. This application enhances the showcased exhibits’ pages to achieve their full marketing potential. The application shows all that the exhibits have to offer through the use of multimedia. The key features of the application include:

• Virtual tours were created for 11 of the 12 exhibits. For the Cincinnati History Museum “Cincinnati in Motion” exhibit, an interactive element has already been developed by HSR Business-to-Business (1).

• At least one interactive game was created to accompany an exhibit from each of the three museums.

• The virtual tours and interactive games are located in the Interactive Media application accessible by a list of interactive components on the bottom of each showcased exhibit Web page (Figure 3).

• Users are able to navigate to all parts and exhibits of the Interactive Media application from any starting location within the application; the application is a standalone application and a direct complement to each showcased exhibit Web page.

• Virtual Tour video has an optimal balance between quality and load efficiency.
• An Image Viewer application replaces the exhibits’ current static image display. This application is animated and dynamically populated based on the contents of the image folders on the Web server.

2.2 User Profiles

There are two user profiles for the Cincinnati Museum Center Interactive Media application.

2.2.1 Web Site Visitor

The Web site visitor is any viewer of Cincinnati Museum Center’s Web site. This user profile includes children, students, parents, teachers, and any other member of the public. This user has the ability to view virtual tours and photo slideshows, to play interactive games, and to navigate between the showcased exhibits’ interactive media components.

2.2.2 Web Site Administrator

The Web site administrator is anyone who is responsible for updating/modifying the content on the Cincinnati Museum Center Web site. If a Web site administrator wants to add or remove pictures from an exhibit’s photo gallery, he or she only needs to modify the contents of an image folder on the Web site’s server. The Image Viewer component is set up in a way that allows the images included to be based on the contents of that particular folder—making the image display dynamic.

The virtual tour viewer is set up similarly. The video files are external of the .swf viewer file. If the Web site administrator would like to modify a particular video, he or she only needs to replace the video file on the Web server, and the virtual tour will be updated dynamically.
3. Design Protocols

3.1 Organizational Scheme

The organizational scheme is straightforward. A Web site visitor navigates to Cincinnati Museum Center’s Web site, he or she views a showcased exhibit’s page, and from there, he or she selects an interactive component from the list at the bottom of the page (Figure 3). This selection will launch the Interactive Media application—from which the user can view virtual tours, view photo slideshows, play interactive games, and navigate amongst the other showcased exhibits’ interactive media components. For details, see the Use Case Diagram in Figure 4.
3.2 Branding Standards

Certain branding standards needed to be followed when designing the Interactive Media application. Following these standards allows the application to be consistent with Cincinnati Museum Center’s Web site.

<table>
<thead>
<tr>
<th>COLOR</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>#FF6500</td>
<td>Primary (Exhibit Pages)</td>
</tr>
<tr>
<td>#7ED8EB</td>
<td>Secondary</td>
</tr>
<tr>
<td>#8A9DBE</td>
<td>Accent/Logo</td>
</tr>
<tr>
<td>#A3BE36</td>
<td>Primary (Educator Pages)</td>
</tr>
<tr>
<td>#FFBF49</td>
<td>Primary (Information Pages)</td>
</tr>
<tr>
<td>#9953A0</td>
<td>Primary (Membership Pages)</td>
</tr>
</tbody>
</table>

Figure 5: Color scheme

Figure 6: Design elements
In addition to the color scheme, other design elements were used. Figure 6 shows the symbols and imagery that are used throughout the Web site. Most of these elements were used when designing the Interactive Media application.

4. Deliverables

1. The project includes an ASP- and Flash-based application interface that:
   a. Follows Cincinnati Museum Center design standards.
   b. Allows for navigation to and from interactive components and amongst all showcased exhibits from all three museums.
   c. Provides an interface to all Interactive Media components.
   d. Includes the exhibit descriptions for each showcased exhibit and includes instructions for locating a specific exhibit’s Interactive Media components.

2. The project includes 11 narrated virtual tours for the showcased exhibits.
   a. The virtual tours are contained within a single .swf Flash container. This file receives the video location through Flash variable parameters passed by the ASP file.
   b. The virtual tours’ durations are between one and two minutes.
   c. Transitions between scenes in the virtual tours are fades.

3. The project includes an interactive game for an exhibit from each of the three museums.
   a. Bat Game: A bat game was developed to accompany The Cavern exhibit of the Museum of Natural History and Science. This game has three levels of difficulty: beginner, intermediate, and advanced.
   b. Ball Game: A ball game was developed to accompany the Energy Zone exhibit of Cincinnati Children’s Museum. This game has fully modifiable speed and difficulty settings, allowing a unique experience for users of all skill levels.
   c. Puzzle Game: A puzzle game was developed to accompany the Settlement exhibit of the Cincinnati History Museum. This game
contains three unique puzzles.

4. The project includes a Flash image viewer that uses the images already captured for the current Web site.

   a. This image viewer allows Web administrators to upload image files into a folder to update an exhibit’s gallery dynamically.

   b. The image viewer is capable of displaying as few or as many images as the Web administrator desires.

5. Proof of Design

   The need for interactivity was met through the completion of the deliverables.

5.1 Interactive Media Application Design

   The Interactive Media application design follows the color scheme shown in Figure 5 and uses the design elements shown in Figure 6.

Figure 7: Interactive Media application screen shot
The application design shown in Figure 7 has an Interactive Media logo in the upper left corner. The navigation links to all three museums are to the right. Once those links are clicked, the secondary navigation links appear with the specific exhibits for each museum. An example of an expanded secondary navigation menu is shown in Figure 8. The link in the upper right corner of the page closes the window. The header above the body of the page displays the name of the exhibit being viewed.

Below the header and header line is the body of the page. When a component is accessed, this part of the page will change accordingly. Also, the subtitle in white text with the orange background will change. To the right of this subtitle are the links to other interactive components that are included for the particular exhibit.

5.2 Navigation

Navigation within the Interactive Media application functions similarly to that of the main Web site. Users use the primary navigation menu to bring up the exhibit links as shown in Figure 8. From each exhibit page, users use the orange links in the lower right corner of the page to navigate to specific components.

**Figure 8:** The exhibit links for the Museum of Natural History and Science navigation

Recall that users are also able to navigate to Interactive Media components by clicking a component from the list at the bottom of the main exhibit pages (Figure 3).
5.3 Virtual Tours

The exhibit virtual tours are approximately one to two minutes long. They contain narration, subtle background music, and accompanying video to describe the exhibits. The video is sharp and quick-cutting; most scenes do not last longer than five seconds. The only transition between scenes is the fade transition.

The virtual tours have clear navigation. The design of the virtual tour container is shown in Figure 9. Essential video navigation tools are Rewind, Play, Pause, and Volume Controls. This virtual tour container was customized specifically to meet the standards of Cincinnati Museum Center.

Figure 9: Video controls

Video narration and background music is upbeat and lively. The narration text is interesting and informative. The Virtual Tour scripts for the Museum of Natural History
and Science, the Cincinnati History Museum, and the Children’s Museum are included in Appendix A.

5.4 Flash Detection

Flash detection will accompany the virtual tours to be sure that all users’ systems meet the requirements to effectively view the Flash video. Encoding video with the On2 VP6 codec creates smaller file sizes and crisper, better quality video; however, only users with Flash Player version 8 or above can view the files. Encoding video with the Sorenson Spark video codec creates worse quality video, but the video is viewable with Flash Player versions 7 and 8. The Flash detection code in the virtual tours determines which version of Flash the user has, and displays the video encoded with the required codec.

If the user has version 8 or above, the On2 VP6-encoded video will be shown. If the user has version 7, the message in Figure 10 is shown below the Sorenson Spark-encoded video.

Flash Player versions 6 and below do not support Flash-encoded video. If a user has any of these versions, the message in Figure 11 will be shown in place of the virtual tour component.
5.5 Image Viewer

The Image Viewer incorporates all of the same design fundamentals. It is capable of displaying as many or as few images as the Web administrator chooses. Figure 12 shows the first four images of the Ice Age exhibit. Figure 13 shows the Image Viewer after the user has clicked “Next >”.

Figure 12: Image Viewer application—first four images
5.6 Interactive Games

Although the Interactive Games have the flexibility of using colors other than the Cincinnati Museum Center’s colors, the primary use of color and text will be based on the aforementioned design principles. The game designs also incorporate lively animations and figures that encourage user participation.

5.6.1 Museum of Natural History and Science: The Cavern “Bat Game”

The game for the Museum of Natural History and Science involves navigating through a cave maze using only a limited field of sight. This is intended to reflect how a bat would navigate in a dark cave using only its sonar abilities.

The instructions and main menu screen are shown in Figure 14. As shown, the user has three difficulty options: beginner, intermediate, and advanced. The game is timed (time is indicated by the timer in the upper right corner), inspiring competition to beat a personal time or a friend’s time.
A user playing the intermediate level is shown in Figure 15. As the bat bumps into walls, its health drops (health is indicated by the health meter in the bottom right corner). Once the health is gone or if the user bumps a wall too hard, the game is over and the user must start from the beginning or return to the main menu. If the user successfully completes the maze, he or she receives a congratulatory message and a summary of the time and the difficulty level. The user loss and the user win messages are shown in Appendix B.
5.6.2 Children’s Museum: Energy Zone “Ball Game”

The game for the Children’s Museum involves trying to separate red and blue balls into their respective sides by using the mouse to move a dividing barrier. This game reflects the atmosphere of the Energy Zone exhibit, which is filled with vibrantly colored balls and various stations to experiment with energy and the elasticity of the balls.

The instructions and main menu are shown in Figure 16. As shown, the user has the ability to select the number of balls and the speed at which they move. The game is timed (time is indicated by the timer in the upper left corner), inspiring competition to beat a personal time or a friend’s time.

A user playing on medium speed with five balls is shown in Figure 17. As the user moves a ball to the correct side, the animated cartoons react positively. Conversely, as a user moves a ball to the incorrect side, the animated cartoons react negatively. Once all of the red balls are on the red side and all of the blue balls are on the blue side, the
user is greeted with a “WINNER!” message. He or she is then offered the opportunity to play again. The win message and the settings selection screen are shown in Appendix C.

The Energy Zone exhibit is filled with vibrantly colored balls.

Zach and Joel love playing in the Energy Zone. But Greg only likes the red balls and Joel only likes the blue ones. Try to please both of them by getting the red balls on the left side and the blue balls on the right side!

+ PLAY!

Figure 16: Ball Game introduction/instructions

Figure 17: User playing Ball Game with five balls on medium speed
5.6.3 Cincinnati History Museum: From Settlement to 1860 “Puzzle Game”

The game for the Cincinnati History Museum involves piecing together puzzle pieces to create images depicting historic scenes from the From Settlement to 1860 exhibit.

The instructions and main menu screen are shown in Figure 18. As shown, the user has three puzzle options. The game is timed (time is indicated by the timer in the upper right corner), inspiring competition to beat a personal time or a friend’s time.

A user playing the steamboat puzzle is shown in Figure 19. The user clicks puzzle pieces to drag them, and as he or she finds matching pieces, they click together to form a single unit. The user can click “RETURN TO MAIN MENU” (in the bottom right corner) at any time to start over. If the user successfully completes the puzzle, he or she receives a congratulatory message and a summary of the time. The user win message is shown in Appendix D.

![Figure 18: Puzzle Game introduction/instructions](image)
6. Development

6.1 Project Schedule

A detailed baseline timeline outlining the breakdown of work by deliverable is shown in Figure 20. The main components of the project are flush left: Senior Design, the Application, the Image Viewer, the Interactive Games, the Virtual Tours, Testing, and Publishing.

Within the Interactive Games and Virtual Tours schedules are the specific processes that were used to create the deliverables for each museum/exhibit. Senior Design (project management) and testing occurred throughout the duration of the project.

This baseline schedule was developed at the start of the project. The actual schedule, modified to show the actual duration and dates of task completion, is shown in Figure 21.
Figure 20: Baseline task schedule
Figure 21: Actual task schedule
6.2 Project Budget

The project budget was based on specific software, hardware, and human labor resources. A detailed list of the project resources is shown in Figure 22.

<table>
<thead>
<tr>
<th>Resource Name</th>
<th>Type</th>
<th>Material Label</th>
<th>Std. Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Joel Willis - Project Manager</td>
<td>Work</td>
<td></td>
<td>$80.00/hr</td>
</tr>
<tr>
<td>2 Joel Willis - Graphic Designer</td>
<td>Work</td>
<td></td>
<td>$30.00/hr</td>
</tr>
<tr>
<td>3 Joel Willis - Web Developer</td>
<td>Work</td>
<td></td>
<td>$40.00/hr</td>
</tr>
<tr>
<td>4 Joel Willis - Videographer</td>
<td>Work</td>
<td></td>
<td>$50.00/hr</td>
</tr>
<tr>
<td>5 Dell PC</td>
<td>Material</td>
<td>Hardware</td>
<td>$900.00</td>
</tr>
<tr>
<td>6 Macromedia Studio 8</td>
<td>Material</td>
<td>Software</td>
<td>$299.00</td>
</tr>
<tr>
<td>7 Web Hosting/Storage</td>
<td>Material</td>
<td>Hardware</td>
<td>$240.00</td>
</tr>
<tr>
<td>8 Digital Camcorder</td>
<td>Material</td>
<td>Hardware</td>
<td>$250.00</td>
</tr>
<tr>
<td>9 Digital Camera</td>
<td>Material</td>
<td>Hardware</td>
<td>$200.00</td>
</tr>
<tr>
<td>10 Adobe Premiere 6</td>
<td>Material</td>
<td>Software</td>
<td>$699.00</td>
</tr>
<tr>
<td>11 Goldwave 5.06</td>
<td>Material</td>
<td>Software</td>
<td>$48.00</td>
</tr>
</tbody>
</table>

Figure 22: Detailed list of project resources and their associated costs

The actual cost for each of the resources for this project was $0. This was based on a number of budget assumptions. In accordance with Macromedia licensing, if a student wishes to publish a product developed with Macromedia software to an organization, non-profit or otherwise, he or she must purchase a non-educational license for that software. However, Cincinnati Museum Center has already purchased a license for the Macromedia Suite. In addition, it has already purchased a Web hosting plan, bringing that cost to $0. For digital photography and video production, personal equipment was used.

The assigned resources by task are shown in Figure 23. This shows the breakdown of hardware and software resources, as well as the time spent for each of the functional roles of the project. Figure 23 also shows the percentage complete, the actual cost, and the baseline cost for 100% completion.
<table>
<thead>
<tr>
<th>Task Name</th>
<th>Resource Names</th>
<th>Baseline Cost</th>
<th>Actual Cost</th>
<th>% Complete</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sensor Design</td>
<td>Dell PC [N2 Hardware]</td>
<td>$1,385.00</td>
<td>$1,453.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Senior Design</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Design Freeze Report</td>
<td>Joe Willis - Project Manager [1%]</td>
<td>$307.20</td>
<td>$275.20</td>
<td>100%</td>
</tr>
<tr>
<td>Prototype Presentation</td>
<td>Joe Willis - Project Manager [20%]</td>
<td>$265.00</td>
<td>$160.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Senior Design</td>
<td></td>
<td>$572.20</td>
<td>$338.40</td>
<td>100%</td>
</tr>
<tr>
<td>Final Report</td>
<td>Joe Willis - Project Manager [1%]</td>
<td>$199.40</td>
<td>$199.40</td>
<td>0%</td>
</tr>
<tr>
<td>Final Presentation (Tech Corp)</td>
<td>Joe Willis - Project Manager</td>
<td>$500.00</td>
<td>$500.00</td>
<td>0%</td>
</tr>
<tr>
<td>- Develop Applications</td>
<td>Dell PC [N2 Hardware]</td>
<td>$1,510.00</td>
<td>$1,580.00</td>
<td>100%</td>
</tr>
<tr>
<td>Design Application</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$428.00</td>
<td>$428.00</td>
<td>100%</td>
</tr>
<tr>
<td>Develop Plan Structure</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$224.00</td>
<td>$84.00</td>
<td>100%</td>
</tr>
<tr>
<td>Code Application</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$225.00</td>
<td>$241.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Develop Image Viewer</td>
<td>Dell PC [N2 Hardware]Macromedia Studio III [3 Software]</td>
<td>$1,679.00</td>
<td>$1,685.00</td>
<td>100%</td>
</tr>
<tr>
<td>Develop Image File Structure</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$224.00</td>
<td>$84.00</td>
<td>100%</td>
</tr>
<tr>
<td>Rough Image Viewer</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$225.00</td>
<td>$84.00</td>
<td>100%</td>
</tr>
<tr>
<td>Place All Images</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$225.00</td>
<td>$84.00</td>
<td>100%</td>
</tr>
<tr>
<td>Final Image Viewer</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$224.00</td>
<td>$84.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Develop Interactive Games</td>
<td>Dell PC [N2 Hardware]Macromedia Studio II [3 Software]</td>
<td>$3,004.00</td>
<td>$3,675.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Museum of Natural History and Sales</td>
<td></td>
<td>$1,829.00</td>
<td>$1,860.00</td>
<td>100%</td>
</tr>
<tr>
<td>Approve Game Idea</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$224.00</td>
<td>$224.00</td>
<td>100%</td>
</tr>
<tr>
<td>Rough Game</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$199.40</td>
<td>$488.00</td>
<td>100%</td>
</tr>
<tr>
<td>Final Game</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$488.00</td>
<td>$285.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Cincinnati History Exhibits</td>
<td></td>
<td>$1,614.00</td>
<td>$2,140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Approve Game Idea</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$224.00</td>
<td>$224.00</td>
<td>100%</td>
</tr>
<tr>
<td>Rough Game</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$225.00</td>
<td>$225.00</td>
<td>100%</td>
</tr>
<tr>
<td>Final Game</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$224.00</td>
<td>$224.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Childrenee's Museum Exhibits</td>
<td></td>
<td>$2,344.00</td>
<td>$1,940.00</td>
<td>100%</td>
</tr>
<tr>
<td>Approve Game Idea</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$224.00</td>
<td>$224.00</td>
<td>100%</td>
</tr>
<tr>
<td>Rough Game</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$225.00</td>
<td>$225.00</td>
<td>100%</td>
</tr>
<tr>
<td>Final Game</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$224.00</td>
<td>$224.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Develop Virtual Tours</td>
<td>Dell PC [N2 Hardware]Digital Camcorder [1 Hardware]</td>
<td>$5,048.00</td>
<td>$5,366.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Museum of Natural History and Sales</td>
<td></td>
<td>$1,070.00</td>
<td>$1,280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Scout the Exhibits</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Write Virtual Tour Scripts</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Initial Video</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Rough Virtual Tour (No Audio)</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Record Rough Audio</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$48.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Retired Video</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Forelive Video (Audio Placeholder)</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Retired Audio</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Finale Virtual Tour</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Cincinnati History Exhibits</td>
<td></td>
<td>$1,029.00</td>
<td>$1,150.00</td>
<td>100%</td>
</tr>
<tr>
<td>Scout the Exhibits</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Write Virtual Tour Scripts</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Initial Video</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Rough Virtual Tour (No Audio)</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Record Rough Audio</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$48.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Retired Video</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Forelive Video (Audio Placeholder)</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Retired Audio</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Finale Virtual Tour</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Children’s Museum Exhibits</td>
<td></td>
<td>$1,038.00</td>
<td>$1,420.00</td>
<td>100%</td>
</tr>
<tr>
<td>Scout the Exhibits</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Write Virtual Tour Scripts</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Initial Video</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Rough Virtual Tour (No Audio)</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Record Rough Audio</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Retired Video</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Forelive Video (Audio Placeholder)</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>Capture Retired Audio</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$140.00</td>
<td>$140.00</td>
<td>100%</td>
</tr>
<tr>
<td>Finale Virtual Tour</td>
<td>Joe Willis - Videographer [10%]</td>
<td>$280.00</td>
<td>$280.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Test</td>
<td></td>
<td>$1,068.00</td>
<td>$1,680.00</td>
<td>100%</td>
</tr>
<tr>
<td>Test</td>
<td>Joe Willis - Web Developer [1%]</td>
<td>$358.00</td>
<td>$358.00</td>
<td>100%</td>
</tr>
<tr>
<td>Refine</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$225.00</td>
<td>$225.00</td>
<td>100%</td>
</tr>
<tr>
<td>Approve</td>
<td>Joe Willis - Web Developer [1%]</td>
<td>$358.00</td>
<td>$358.00</td>
<td>100%</td>
</tr>
<tr>
<td>- Publish</td>
<td>Web Hosting Storage [1 Hardware]</td>
<td>$724.00</td>
<td>$50.00</td>
<td>4%</td>
</tr>
<tr>
<td>Move to Production</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$112.00</td>
<td>$0.00</td>
<td>0%</td>
</tr>
<tr>
<td>Test</td>
<td>Joe Willis - Web Developer [10%]</td>
<td>$112.00</td>
<td>$0.00</td>
<td>0%</td>
</tr>
</tbody>
</table>

Figure 23: Assigned resources by task and actual/baseline costs
By adding up the individual task baseline costs shown in Figure 23, the total baseline budget for the project came to $14,493.60. Again, the actual cost of the project will be $0 because of the existing, available resources and volunteered labor.

6.3 Deviations from the Baseline

Deviations from the baseline budget and schedule were few and slight. However, some tasks took less time than planned in the baseline and some tasks needed to be postponed or took more time than planned.

The “Record Rough Audio”, “Capture Refined Video”, and “Finalize Video (Audio Placeholder)” tasks took much less time than expected. This is shown by decreased task durations (Figure 21) and lower actual costs for those tasks (Figure 23).

Because the game for the Children’s Museum required ActionScripting code that was similar to the game for the Museum of Natural History and Science, the task for creating that game was moved up to replace the task for creating the Cincinnati History Museum game.

In addition, because the code for the Children’s Museum game built upon code developed earlier in the project, this task took much less time. The lower actual cost can be seen in Figure 23 and the reduced time can be seen in Figure 21.

Sufficient schedule contingency was built into the baseline schedule; overall, no tasks exceeded their planned durations from the baseline schedule.

7. Testing Procedures

The project was tested extensively to avoid any incompatibility issues and load efficiency problems.

1. The application was tested on the following browsers:
a. Microsoft Internet Explorer  
b. Mozilla Firefox

2. The application was tested on the following Operating Systems:  
a. Mac OS  
b. Windows OS

3. The application was tested on the following Internet connection speeds:  
a. Dial-up  
b. Broadband

4. The application was tested on computers using different versions of Macromedia Flash Player.

5. The Image Viewer application was tested using:  
a. Four images  
b. One image  
c. Five images  
d. More than ten images  
e. More than twenty images

8. Conclusion/Recommendations

The Cincinnati Museum Center Interactive Media project met the Center’s need for enhancing its Web site with interactivity. The project was able to meet this need by fulfilling all of the deliverables on time, on budget, and at a high quality. As a result of the project, the Museum Center Web site is now capable of attracting the maximum number of visitors.
Most of the difficulties faced during development of the project were not contained to a specific area. In addition, there were not any critical problems. However, it is recommended that for future projects with a similar project schedule time frame, a smaller project scope be chosen. 11 virtual tours is a daunting task by any measurement. The project scope defined by the deliverables took an experienced Web developer and multimedia producer 15-20 hours per week for nearly 8 months. This project would have been a success even if a smaller scope had been chosen—for example, just one virtual tour for each of the three museums.

9. References


    Personal Interview. 09 Nov. 2005.

    2005.
    <http://www.macromedia.com/software/flash/flashpro/video/?promoid=flashvideo_gallery_learnmore_020304>
Appendix A – Virtual Tour Scripts

A.1. Museum of Natural History and Science

A.1.1 All About You

Welcome to All About You, an exhibit in the Museum of Natural History and Science. This exhibit allows you to explore science of the human body, without leaving the comfort of your own.

Begin by gaining knowledge about each of the five senses and then applying that knowledge in exciting hands-on activities. Reach through cloth to identify an object using only your sense of touch. Sniff to identify mystery scents such as roses, peanut butter, or pizza. Or turn a crank, repair an eye’s vision, and marvel at the workings of the sense of sight!

Mr. Bones, the skeleton, shows the human Skeletal System up close and personal. Or meet Stuffee, a giant doll, who can teach children how various organs function.

Your pulse will race as you attempt to maintain a consistent beat on a simulator that shows the brute strength of the human heart.

Are you eating healthy? Choose from a variety of delicious meals and find out if you are making the correct dining selections.

And don’t forget to floss! Maintaining a healthy smile will be even easier after brushing and flossing with the giant teeth models.

All About You covers all of this and more. Stop in today to experience the exhibit first hand. You’ll walk away with a bright smile and a newfound respect for the human body!
A.1.2 Nature’s Trading Post

Welcome to Nature's Trading Post, an exhibit in the Museum of Natural History and Science. This exhibit teaches children about responsible collecting and preservation of the environment.

Following collecting guidelines, a visitor can bring in an item made by nature and earn points to trade based on where the item was found, its quality, and uniqueness.

Nature is all around, and interesting specimens of nature in action can be found in your own backyard. Come in to Nature’s Trading Post to see examples such as a gigantic sheet of snakeskin, a large eagle, reptile skin, fossils, exotic plants, and more!

Kids will love the environment of Nature’s Trading Post, as it engages the mind and the spirit through educational and stimulating decorations and space to explore submitted items.

The exhibit’s staff will provide assistance to children and answer any questions. Visit this exhibit in person to discover the worth of your nature findings. That fossil you found in your backyard could be worth its weight in gold… or at least its weight in snakeskin!

A.1.3 Cincinnati’s Ice Age: Clue Frozen in Time

Welcome to Cincinnati’s Ice Age: Clues Frozen in Time, an exhibit in the Museum of Natural History and Science.

Step back in time to the Ohio Valley 19,000 years ago when the last glacier in this area started its retreat north. You’ll begin the exhibit by assuming the role of a detective hunting for evidence of the great Ice Age that once covered the Cincinnati area. The exhibit’s guided path will reveal clues of an environment much different than our own.
Life-sized models and skeletal structures will give you an idea of the creatures that once roamed the Tri-state. See if you can distinguish between carnivores and herbivores, or enjoy several computer games that reinforce the exhibit’s exciting information.

Walk through a recreated glacier and experiment with water run-off in the stream table, or learn about the force of a glacier by trying to move a rock over another rock as a glacier would.

Don’t forget to bundle up. A mammoth-sized ice cave leads to a trail that compresses the view of about 30 miles from the cold, dry end of the glacier in Ohio to the pine forest and bogs of Northern Kentucky. Be careful though, wild animals are scattered throughout the trail!

The *Cincinnati’s Ice Age* exhibit is a history lesson you won’t soon forget. Bring your curiosity and a knack for solving mysteries, and rediscover *Cincinnati’s Ice Age*, by uncovering clues forever frozen in time.

**A.1.4 The Cavern: A World Without Light**


Explore this simulated limestone cavern modeled on caves found in the Tri-state region of Ohio, Indiana and Kentucky. The cave covers two levels and 500 feet of darkened passageways. The two levels are split into a beginner's trail and an advanced trail.

The beginner's trail is wheel-chair and stroller accessible and provides lookout points to the lower advanced trail. Although this trail does not have tight passages or steep steps, it is nonetheless intriguing and educational!
Pass through bars at the start of the advanced trail to get a feel for the narrowest portions of the trail. Highlights of the advanced trail include a waterfall, an underground stream, a formation chamber and the bat chamber—home to the museum's own Big Brown Bat colony.

Throughout the trails, view examples of cavern-dwelling creatures and insects, as well as stalagmites and stalactites.

Perhaps the most popular exhibit in the Museum of Natural History and Science, the Cavern is the safest and most exciting way to explore the dark depths of the caves surrounding the Tri-state area.

A.2. Museum of Natural History and Science

A.2.1 Cincinnati Goes to War: A Community Responds to World War II

Welcome to Cincinnati Goes to War, an exhibit in the Cincinnati History Museum.

Witness the effects World War II had on the Cincinnati home front. Contrast those impacts with the rest of the country, and the entire world.

Climb aboard a restored streetcar—and get a history lesson from the driver, who is more than willing to explain Cincinnati of the past. Get a detailed account of Greater Cincinnati's wartime contributions. From rations to increased production, everyone had to pitch in.

Examine the life in Cincinnati during World War II and take a look at the numerous authentic artifacts—including military vehicles, artillery, Nazi paraphernalia, and a life-sized prop-plane. Or stop by the Flynn household and discover the impact war had on hometown families.
Witness the anguish of loss, and honor the fallen Cincinnati soldiers. Finally, celebrate V-Day all over again with larger than life historic photos and statues.

Beautifully detailed scenes cover the subjects of *Doing Your Bit*, *Plowshares into Swords* and *Serving Uncle Sam*. Hands-on activities and videos allow you to experience this period of our history firsthand.

From the start of the war to the recovery effort immediately following, *Cincinnati Goes to War* provides a distinctly realistic perspective of what it was like to live in Cincinnati during World War II.

**A.2.2 Forming a New World: Cincinnati's Machine Tool Industry, 1850-1930**

Welcome to *Cincinnati’s Machine Tool Industry*, an exhibit in the Cincinnati History Museum.

Between 1850 and 1900, Cincinnati was the machine tool capital of the world. Experience this part of Cincinnati’s history first hand.

The exhibit includes the 1910 shop—a recreated, working, turn-of-the-century machine shop. Kids won’t be left out; there’s a kid’s building shop as well!

Take a look around at the various types of machines used in the late 19th century—from the primitive tools to the complex, sophisticated machinery that sparked the industrial revolution, it’s all here.

Get hands on, and operate some antique machines yourself!

There are many other machine tool-related artifacts, and several examples of the products that depend on machine tools…Machines of the 1800’s and 1900’s created many of the inventions still around today—from deadly weapons to practical methods of transportation.
Cincinnati was built by hard workers and innovative thinkers. Stop in to the *Cincinnati’s Machine Tool Industry* exhibit to rediscover the ingenuity of Cincinnati’s forefathers.

**A.2.3 Cincinnati: From Settlement to 1860**

Welcome to *From Settlement to 1860*, an exhibit in the Cincinnati History Museum. Take a walk through this exhibit to experience the growth of Cincinnati from before settlement by Europeans to the year 1860.

Begin in the pre-settlement years and discover Cincinnati Native American life through life-sized models, scenes showing Native American teepees, and even a full-size canoe.

Continue through the exhibit to experience early settlement life. This section includes a scale model of the Tri-state area as it appeared over 200 years ago, with indicators marking notable areas of settlement. You’ll also marvel at the detail of a scale model of the famous Fort Washington.

You’ll discover that as time passed, life got a little easier. Recreated cabins will show you what homes were like in this time period.

Listen to words of wisdom and interact with Cincinnati’s earliest politicians as they debate the current-state of a newly thriving city.

Kids will enjoy this exhibit as well. They’ll love negotiating canal boats through the 50 foot model of the Miami and Erie Canal or imagining floating down the Ohio River on a child-sized flatboat that can be taken apart to build a cabin.

Is that all that this exhibit has to offer? Not even close!

As the Cincinnati population increased, the settlement became a bustling metropolis.
The Settlement exhibit culminates at the Cincinnati landing. You’ll be amazed by this recreated town. Stare up at the two story buildings or marvel at the cobblestone roads. There are even replica street lights and fire hydrants!

At the landing dock is a breathtaking model of an old-fashioned coal-powered steamboat. You don’t just have to admire from afar, you can come aboard! Try your hand in operating the steamboat’s machinery, and learn more about the technology through hands-on activities.

You can also visit the town’s shops. The town is filled with friendly workers who will be happy to discuss historic Cincinnati. Stop into the town’s museum, or visit the town’s printmaking shop. Here you can witness printmaking as it was performed over a hundred years ago. It’s remarkable to see how things were done in the Cincinnati of yesteryear!

Through historically accurate scenes, music and recordings of letters, and words from people living in the area, Settlement exhibit visitors experience the full gamut of life in early Cincinnati. Stop in soon!

A.3. Children’s Museum

A.3.1 Kid’s Town

Welcome to Kid’s Town, an exhibit in the Children’s Museum. Kid’s Town is a small town with big opportunities for creativity and imagination.

Children take charge in this kid-sized neighborhood. This town has a grocery store filled with fruits and vegetables, an automobile fix-it shop for repairing vehicles of all sizes, a diner for an afternoon snack, and more. Kid’s Town provides opportunities for children to imagine, pretend, and try out adult roles.
Children will also feel at home in houses that are their size, filled with toys and games to keep smiles on their faces.

Bring your kids in soon. They’ll love pretending to grocery shop, fill the family car up with gas, or stop by the diner for an afternoon snack.

Children can’t get enough of Kid’s Town, because it’s built especially for them!

A.3.2 Little Sprouts Farm

Welcome to Little Sprouts Farm, an exhibit in the Children’s Museum.

Your child will love experimenting with motion on a roller track for tennis balls, or a working, mechanical windmill.

Little Sprouts Farm is a playground of excitement for younger kids. The Infant Garden and Toddler Farmyard provide a protective and appealing setting for children 4-years-old and younger and their caregivers. Toddlers and preschoolers can climb up into the barn and ride the slide back down, sort fruits and vegetables in the farmer’s market, compose music using barnyard instruments, and gather around the Story Tree and create their own puppet shows.

The infant area includes the Parent Resource Center as well as a play space for crawlers and early walkers. This soft-sided area is filled with plush toys and colorful objects to enhance early sensory experiences.

This farm was built for the Little Sprouts, but it’s enjoyable for folks of all ages!

A.3.3 Energy Zone

Welcome to the Energy Zone, an exhibit in the Children’s Museum. Walk into this netted enclosure and become a part of a complex machine. As soon as you enter,
you’ll feel as though you’re surrounded by energy! Colorful balls fill the exhibit to the brim with fun and excitement.

Individual stations offer chances to play with all kinds of energy. Air pressure allows a ball to levitate in mid-air! Throw in more balls and see what happens!

Toss the balls into a basketball hoop and then shoot them out of a vacuumed tube at a target. Or use mechanical levers and pulleys to send the balls up and away.

Working cooperatively, visitors use all of these forms of energy to fill the Big Bucket. If you hear a bell and see the flashing blue siren light—watch out! It's time for the balls to come raining down. See how many you can catch and collect or try to just find your favorite colors!

Kids and adults alike will have a ball in the **Energy Zone**.

**A.3.4 The Woods**

Welcome to *The Woods*, an exhibit in the Children’s Museum. This wilderness is an adventure playground. Crawl through hollow-log climbing structures, wiggle your way through a rope bridge, or attempt to scale the horizontal climbing wall. There are also areas for discovering wilderness-dwelling creatures.

Look out from the second story of the wheelchair accessible tree house to view the real waterfall that trickles down the rocks into a pond full of live river creatures.

There’s a pond stocked with huge fish that are at home in this wooded environment. And they’re not alone; look closely to spot the turtles resting on the rocks above!

An adventure based wilderness, The Woods encourages children to challenge their physical prowess and explore their imaginations. Stop in soon.
Appendix B – Bat Game Screenshots

Figure 24: Bat Game win message

Figure 25: Bat Game lose message
Appendix C – Ball Game Screenshots

Figure 26: Ball Game win message

Figure 27: Ball Game settings selection screen
Appendix D – Puzzle Game Screenshot

Figure 28: Puzzle Game win message