Museum Kiosk Review

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1.0 Introduction

The Museum of Science and Technology (SAT) have requested the design and implementation of a web-technology enabled kiosk system. This system must provide an accessible interface to visitors that will allow them to obtain an overview of the museum layout and find details of the exhibits they intend to visit.

1.2 Scope

This document intends to cover phase two (2) of the implementation. It will encompass the design and implementation of the high fidelity prototype for final acceptance testing. The procedure, results and subsequent analysis of this acceptance testing will be used to compile a list of amendments to be made before implementation of the final kiosk product.

1.3 Assumptions

This project makes the assumptions that all available information required has been disclosed in full and full use of relevant technologies (hardware interfaces, HTML5, CSS and JavaScript) is acceptable.

2.0 High Fidelity Prototype

The prototype has been designed for a 1024x768 pixel touchscreen device and has been tested in Mozilla Firefox and Google Chrome on a Debian Linux platform.

3.0 Walkthroughs Selected

Walkthrough 1

1. Access kiosk
2. View help function
3. View opening times
4. Select Robots room
5. View help again
6. Select 3 exhibits
7. Return to map
8. Select Weird & Wonderful Vehicles room
9. Select 4 exhibits
10. Return to map
11. Leave kiosk

Walkthrough 2

1. Access kiosk
2. Select Robots room
3. Select 2 exhibits
4. Select Weird and Wonderful Vehicles room
5. Select 4 exhibits
6. Select Da Vinci room
7. Select 5 exhibits
8. Select Weird & Wonderful Vehicles room
9. Select remaining exhibits
10. Leave kiosk

Walkthrough 3

1. Access kiosk
2. View help
3. Find the best time for a group to visit over the Easter long weekend.
4. Select Robots room
5. View help
6. Select 1 exhibit
7. Select Da Vinci room
8. Select 3 exhibits
9. Ascertain cost for a group of 3 adults and 4 children under 12
10. Select Robots room again
11. Select Weird and Wonderful Vehicles room
12. View 4 exhibits
13. Leave kiosk

4.0 Acceptance Testing

4.1 Testing Criteria

Interface usability relies on many factors. Nielsen (2012) describes usability as a combination of the five (5) components; learnability, efficiency, memorability, errors and satisfaction. These elements where described in greater depth in the original proposal but were only briefly used to ascertain effectiveness of the kiosk system.

Although subjective assessment on behalf of the user plays a large part in the perception of usability, it is possible to objectively test user experiences to develop a metric analysis. Using a system of walkthroughs, it is possible to determine task completion rates, error levels and effort expended on common use cases. Through this the proposed design can be analysed before the live system is implement to determine possible usability issues, efficiency concerns or functionality errors.

As stated, subjective interpretation plays a major role in usability and attention needs to be focused on user experience as much as statistical data. A Likert scale will be used to capture user satisfaction levels, ease of use and supportiveness of the current design to provide a systematic review of the design. This will be assisted by user responses focused on key features and usability concerns.

The following criteria will be used to ascertain user acceptance*;*

Performance Criteria	**Usability Criteria**
Completion Time	*(uses a Likert scale; 1-5)*
Average time per task	Usefulness of kiosk
Minimum clicks needed	Satisfaction with functionality
Amount of clicks used	Satisfaction with experience
Actual activities involved	Found kiosk supported needs
Activities used	Could proceed without assistance
Errors Made	Efficiency of kiosk
Accuracy percentage	

4.2 Performance Matrix

Subject	Subject One			Subject Two			Subject Three			**Mean**		
Walkthrough	1	2	3	1	2	3	1	2	3	**1**	**2**	**3**
Performance Metrics												
Tasks	14	21	16	14	21	16	14	21	16	**14**	**21**	**16**
Completion Time (in seconds)	38	54	73	41	55	91	39	54	86	**39.3**	**54.3**	**83.3**
Average time per task (in seconds)	2.7	2.5	4.5	2.9	2.6	5.6	2.7	2.5	5.3	**2.8**	**2.5**	**5.2**
Minimum clicks needed	15	24	20	15	24	20	15	24	20	**15**	**24**	**20**
Amount of clicks used	15	24	22	16	24	23	15	24	21	**15.3**	**24**	**22**
Errors Made	0	0	2	1	0	3	0	0	1	**0.33**	**0.00**	**2.00**
Accuracy percentage	100%	100%	90.9%	93.7%	100%	86.9%	100%	100%	95.2%	**97.9%**	**100%**	**91.9%**

Figure 1 Performance matrix

4.3 Usability Matrix

The table below shows the resulting score in a 5 point scale. One (1) represents the lowest score and five (5) representing the highest score.

Subject	Subject One			Subject Two			Subject Three			**Mean**
Walkthrough	1	2	3	1	2	3	1	2	3	
Usability Metrics										
Usefulness of Kiosk	4	5	4	5	4	5	4	4	4	**4.33**
Satisfaction with functionality	4	4	4	4	3	4	4	4	4	**3.88**
Satisfaction with experience	3	3	4	4	4	3	3	3	4	**3.44**
Found kiosk supported needs	5	5	5	5	5	5	5	5	5	**5**
Could proceed without assistance	5	5	5	5	5	5	4	5	5	**4.88**
Efficiency of kiosk	3	4	3	3	3	2	4	5	4	**3.11**

Figure 2 Usability Matrix

4.4 Subjective user responses

Similar to the original low fidelity prototype testing, test subjects were asked to list their 3 favourite features and their 3 most disliked features of the website. The following were the most common responses;

Positive	Negative
Easy to use	Lack of impact
Simple Navigation	Too plain
Exhibit Animations	Map needs animations
Clear Layout	Efficiency can be improved

4.5 Analysis

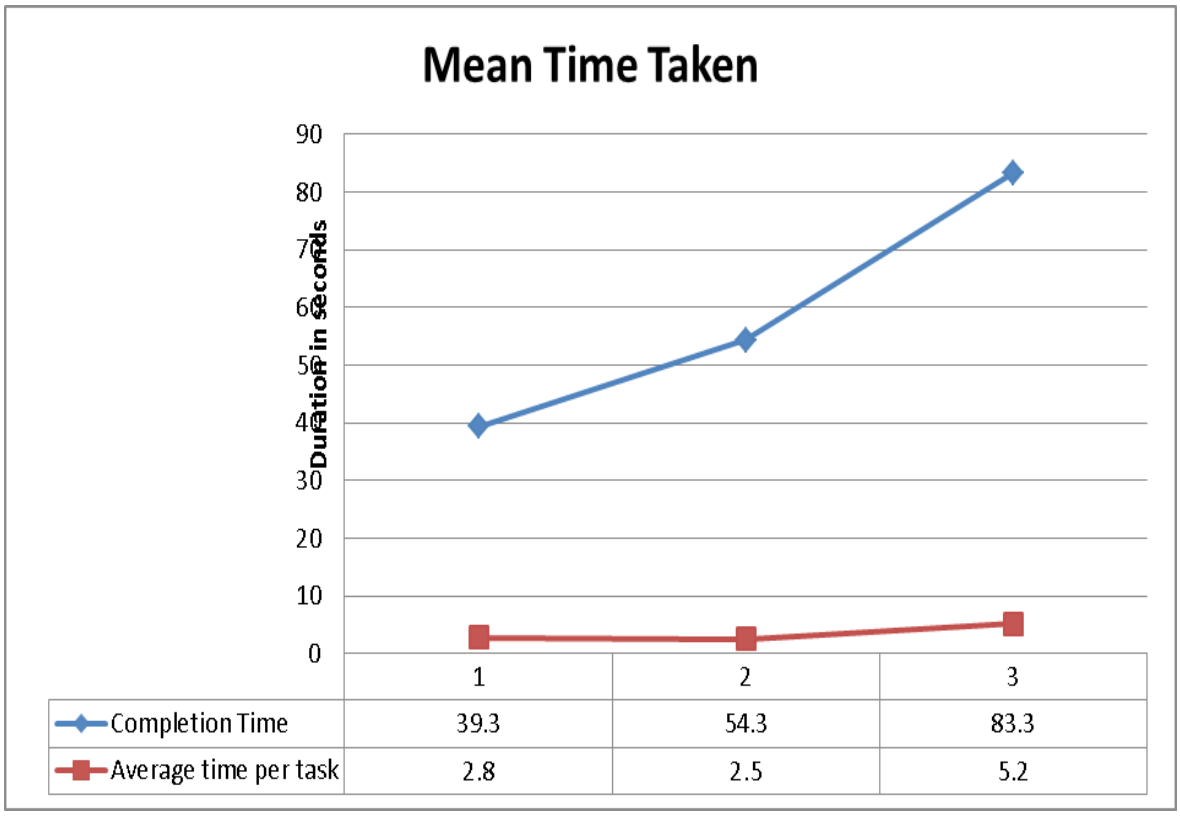
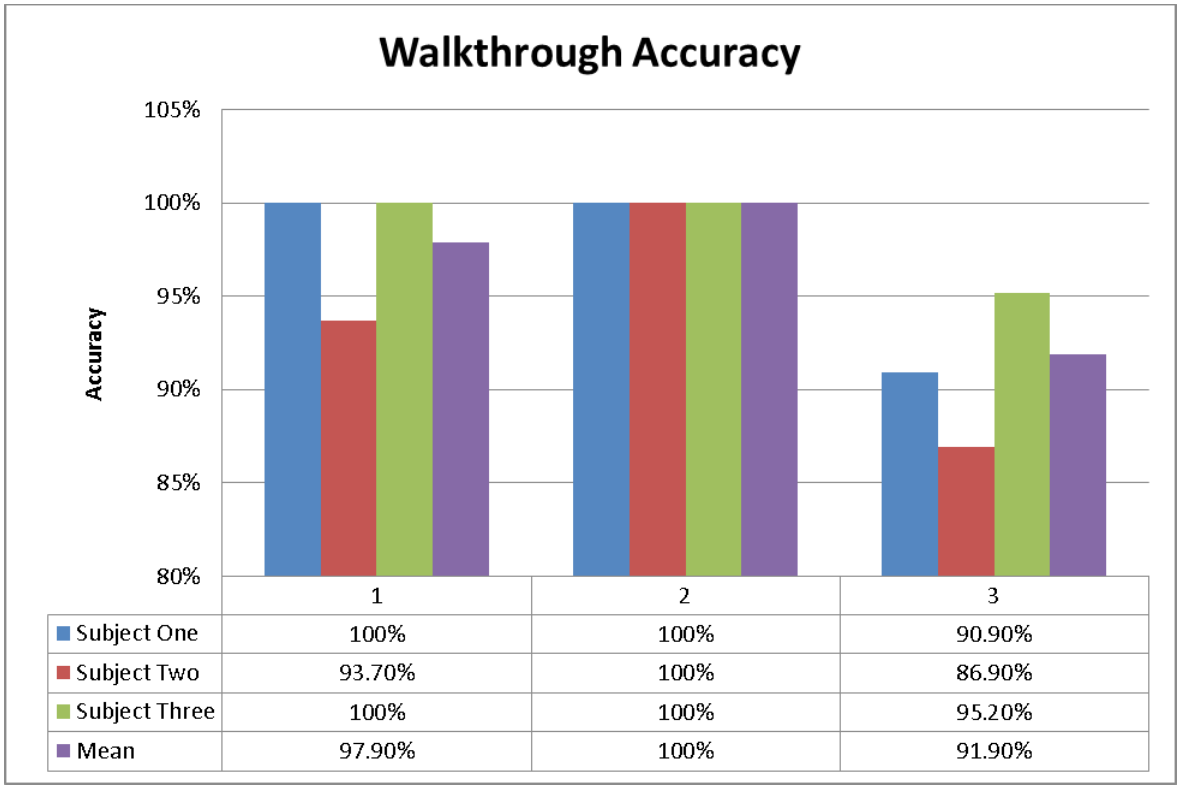
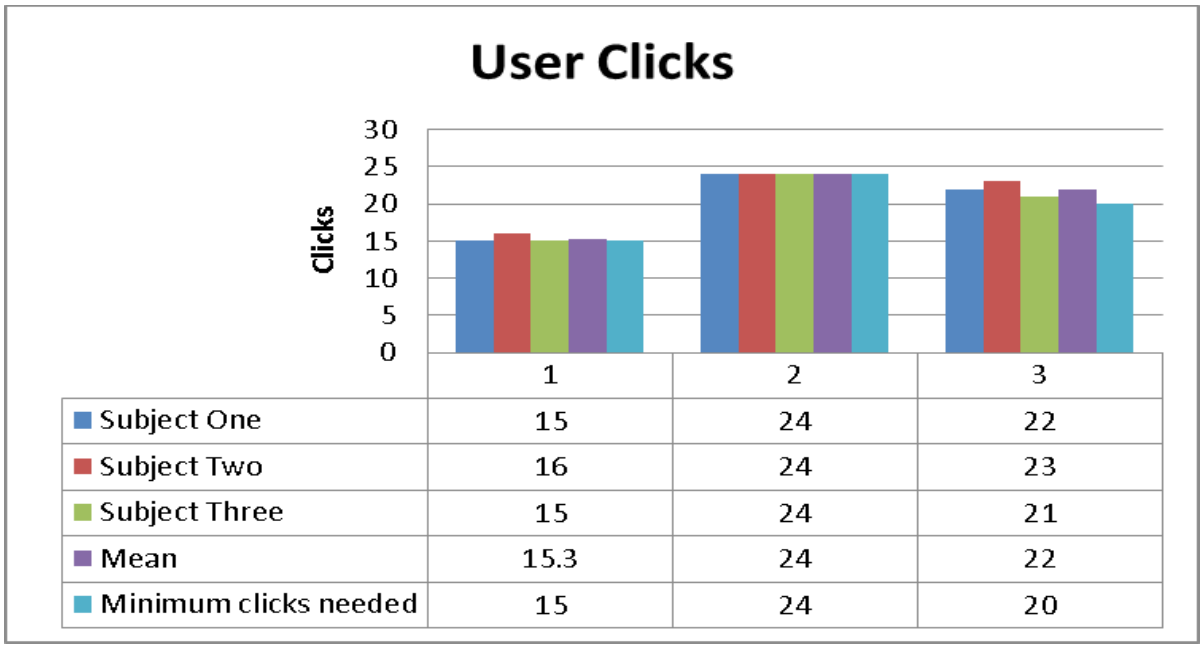


Figure 3 Mean Time Taken Chart



	1	2	3
Subject One	100%	100%	90.90%
Subject Two	93.70%	100%	86.90%
Subject Three	100%	100%	95.20%
Mean	97.90%	100%	91.90%

Figure 4 Walkthrough Accuracy Chart



	1	2	3
Subject One	15	24	22
Subject Two	16	24	23
Subject Three	15	24	21
Mean	15.3	24	22
Minimum clicks needed	15	24	20

Figure 5 User Click Chart

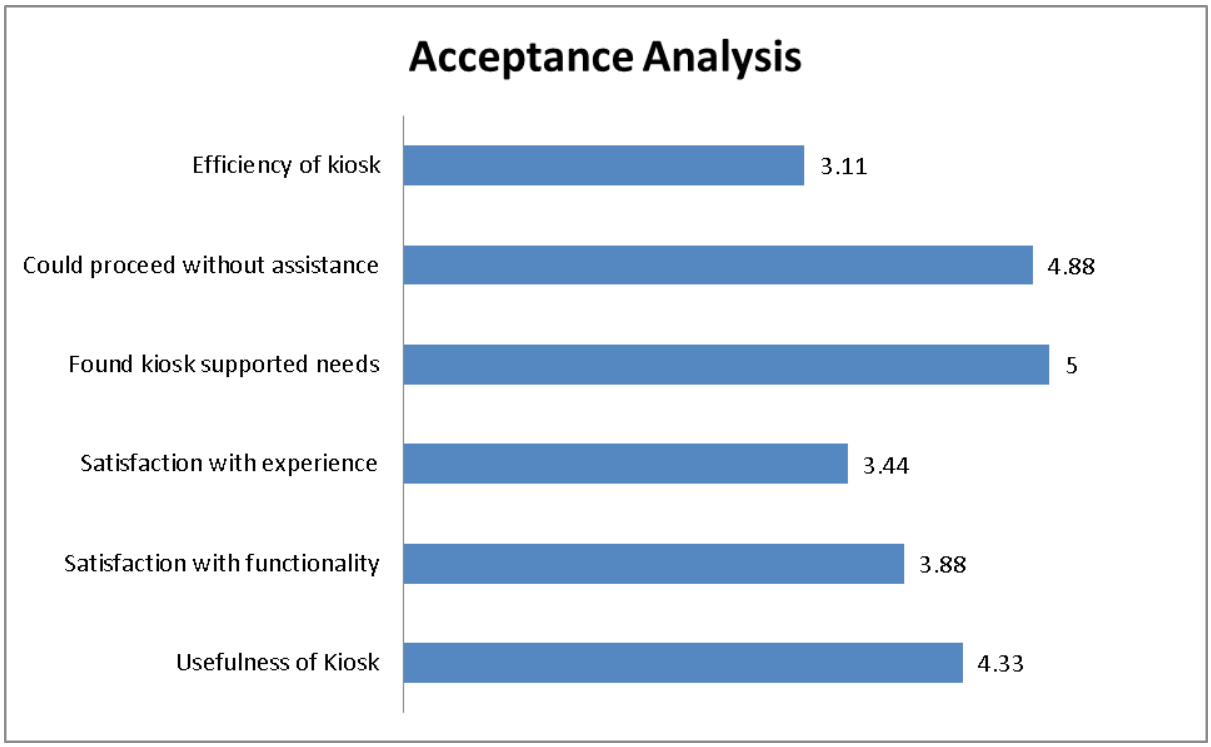


Figure 6 Acceptance Analysis Chart

From the above graphics it can be seen that the overall effectiveness and response to the kiosk design has been positive. *Figure 1* shows the summarised performance metrics of the acceptance testing. The main affective statistic shown here is the 'errors made'. It can be seen that the final walkthrough caused users to make an average of two (2) errors and an average of two (2) clicks more than necessary (*figure 5 and 6*). The average time per task on this walkthrough was also roughly 2.4 seconds slower than other walkthroughs (*figure 4*). After discussion with the test subjects, this has been attributed to the added requirement to calculate and remember prices and times.

The user acceptance tests show an above average response from the subjects. *Figure 6* shows the summarised results from these tests. Scoring the lowest was efficiency, with an average score of 3.11, attributed to the fact changing exhibits required the user to return to the map page every time. Next was satisfaction with the experience and usability of the kiosk, scoring 3.44 and 3.88 respectively. Subjective responses indicated that the users found the kiosk to be lacking in impact and plain in design. Aesthetics were placed low on the priority list initially to ensure usability and this is reflected in the response. Conversely, usability and ease of use scored high with scores of 5.00 and 4.88 showing that the initial focus was met successfully. Finally, users found the kiosk to be useful to their needs, with usefulness of kiosk gathering an average of 4.33.

These results show that although minimal in context of design, the kiosk shows promise for

incorporating the widest range of users. By implementing the language feature that will translate all onscreen text to an alternate language the kiosk can also provide an internationalized experience. See section 6.0 for additional comments on findings and recommendations.

5.0 Notable Features

5.1 Java enabled image resize animation on the exhibit pages

The main feature of the museum kiosk, as implemented, is the Java enabled animations and dynamically updating description text. To the right of the page is a selection of thumbnails displaying all exhibits for a current exhibition. To the left is a larger image of the thumbnail selected and below it a title and brief description of the exhibit. This larger image animates as it grows in size using a small and simple JavaScript file that also controls the text updates. This is done using Document Object Modeling (DOM) based on section id tags. The title and description are hard-coded into the script as arrays and set as variables at the beginning of the script for easy updating and maintenance.

Upon first entering the exhibition page, a sample image is displayed along with a brief instruction to click one of the thumbnails. This implementation offers a pleasant and easy to use experience for the user that is somewhat intuitive to use on a touch interface. Further implementations could include touching the large image to take the user to a more detailed description of the artifact. Possible inclusions for this could include maps of where the artifact was found or developed.

5.2 Persistent navigation buttons and rudimentary help

The kiosk offers persistent navigation buttons in the uppermost center position of the page. This provides the user with a quick and effective way to visualize all possible actions that can be performed by the kiosk and access to these actions. These buttons invert in colour when clicked to provide visual feedback on current location, without taking up any extra space on the kiosk screen. This entire feature is roughly 40 pixels in size and is unobtrusive but striking at the same time. The simple colours can be seen by those with colour vision afflictions.

In addition to the navigation is a simple but informative help screen. Although this is to be expanded to include explanatory images, the current implementation includes basic instructions on how to navigate the page and view exhibits. While neither of these features are particularly noteworthy, together they are greater than the sum of its parts in offering a simple to use interface to all levels of experience.

6.0 Conclusion

6.1 Summary Findings

From the testing and analysis performed above it can be seen that although the kiosk was effective and easy to use, it wasn't visually striking enough to elicit a strong memorable response in users. The kiosk was successful at providing a high level of usability and although further improvements can be made to refine the design, it appears the project is progressing towards the current goal. Recommendations for pre-implementation and post-implementation based on the results gathered are summarised below as well as a list of features yet to be implemented.

6.2 Recommendations

Items to be included but not completed;

- Implement language selection screen to provide accurate and functional translations
- Implement the screen reader functionality to include users that suffer from hearing relation afflictions
- Complete exhibit descriptions and replace placeholder text

Improvements to be made include;

- Redesign the exhibition selection options to remove redundant clicks and improve efficiency of use
- Improve use of graphics to extend to background graphics on pages, instructional diagrams on help pages and opening hours pages to improve visual effectiveness
- Redesign navigation header for greater impact. Incorporate a more unified feel throughout navigation area to define it from the rest of the page.
- Develop a colour schema to apply to the site to improve personalization. Look to current museum literature and iconography for possible reference. Ensure selected schema does not exclude those with colour vision afflictions.

Desired Improvements to be made include;

- Redesign language selection screen to incorporate map graphics for easier identification and a reduced set of languages. Alternatively, include a stereographic globe projection graphic with

touch selectable continents that take users to a localised set of languages. This would reduce screen clutter and options to only those necessary.

- Redesign map for greater visual effectiveness. Include greater detail on map image, replace click-able exhibition circles with context related images, add animation to map when exhibition is selected
- Current Kiosk help is virtually a placeholder, more thought needs to be given to current text

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