

# **Alien Earths**

## **Report of Formative Evaluation**

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### **Introduction and Procedure**

The Space Science Institute of Boulder, Colorado, tested prototypes of their *Alien Earths* (working title) exhibit in three locations in the fall of 2003. Multiple sites were chosen for testing because the completed exhibition will travel, and testing in only one site would not inform how responses to ideas and activities might differ by geographic location. First, four of the components were displayed at the exhibitors' hall of the annual conference of the Association of Science and Technology Centers, which was attended by over 2,000 museum and informal learning professionals. Although no evaluator was present, the exhibit designers gathered suggestions and input from numerous attendees. The full complement of prototypes were tested in N. Carolina at *Sciworks* for one week immediately prior to Thanksgiving, after which they travel to the *Denver Museum of Nature & Science* where they were tested for another week with staff, volunteers and visitors. In both evaluation settings components were displayed with contextual information, so that visitors were given an organizing framework to consider the scientific information.

Formative testing involves inviting visitors or visitor groups to engage with the prototypes and then observing whether or not visitors are able to:

- easily initiate the activity
- complete the activity successfully (as defined by the exhibit designer). If not barriers to success are identified and suggestions for improvement solicited.
- accurately articulate the defined main message of the activity (as defined by the project team)
- Further, visitors are asked to respond to how engaging the activity was and to make suggestions for improvements.

In Formative evaluation small sample sizes are used as it is an in-depth and qualitative procedure. During this testing a total of 97 groups and individual visitors were engaged across both locations. Visitors are engaged as a group (if they are not alone) because that is the way visitors interact with exhibitions naturally. Observations are recorded and later synthesized into a report to inform final product design. This suite of prototypes had a very high level of finish and was a pleasure to test. As well, the addition of the large contextual panels was very helpful. This report encompasses the findings in both North Carolina and Denver.

## **Observations:**

Overall, there was little or no significant difference in findings between DMNS and Sciworks, hence data were collapsed and differences noted only when appropriate. Generally, testing results are very favorable, and visitors enjoyed their experiences. The components operate well, communicate main teaching messages effectively, and visitors are interested in those messages. The specific criticisms and suggestions noted below are intended only to improve the already positive experience for visitors.

### TITLE

The most popular title was *Alien Earths* with *Beyond Earth* a close second. *Final Frontiers* strongly elicited comments about Star Trek. The least popular title was *Habitable Worlds*, most likely because most people had difficulty pronouncing 'habitable.'

## SECTION ONE: PLANETS

### **Is There Life Beyond Earth?**

With this introductory panel, visitors were able to successfully find and use the push button to activate the light. However, most visitors expected more to happen when they pushed this button. Although a light comes on, it isn't obvious, and so is not a dramatic enough response for most. Interestingly, the same image with on the graphic panel from *Where Are we Finding Planets* has a simple and permanent red dot indicating the search location for the planet search and is very successful. Visitors find it exciting and seem to get the message clearly from the non-interactive panel more successfully.

### Recommendation:

1) Either simply to make this a text panel only, or bump up the response to be something more engaging.

### **Where Are We Finding Planets?**

Adults needed assistance to get started on this computer interactive, whereas kids just jumped right in. When the computer was not left on the 'home' page all visitors have trouble getting started. Exhibit developers requested specific input about the amount of information available at this component, which is very dense. It was specifically requested that we investigate which layers or sections of the information were least helpful or engaging, to inform decision-making. In both North Carolina and Denver occasional visitors found the depth of information overwhelming and difficult. This, however, was strongly outweighed by the number of people who enjoyed the depth of information and spent long periods of time at this component. Across the board, the message at DMNS was to not remove any layers of information – but to give better instructions. Visitors' particularly enjoyed being able to click and manipulate or rotate the grid from all perspectives once they figured out that was possible.

Recommendations:

- 1) More obviously orienting the user in terms of our Solar System by naming our Sun and Planets, and adding the Asteroid belt
- 2) Automate the reset button so it more quickly restarts the home page when a user leaves, and/or make it more obvious how to reset the planets after user has been sorting.
- 3) Remove the keyboard commands and other non-existent options as there is no keyboard available in the prototype
- 4) Visitors find it too difficult to click on quickly moving planets in order to identify them, and once successful the text moves too fast to read, thus slow down or stop planets when cursors approach so visitors can be successful.
- 5) Visitors need to know how to zoom out once they've zoomed in.
- 6) Better initial organizing framework for how to navigate and what the learning potential is.

### **Planet Hunters**

**Wobble** – This was probably the most effective prototype for actual learning – for both adults and children. There was some hesitation by adults to pick up and spin the balls initially. Looking through the mystery box was not enormously successful; it did not seem to help most visitors understand the concept. Interestingly, visitors that had interacted with this prototype were able to relate the wobble the spinning balls to the wobble of the sun when pulled by large planets at the Planet Families Interactive.

Recommendations:

- 1) Add a photograph of someone doing the activity so adults are clear how to initiate
- 2) Replace mystery box with animated video footage of a wobbly star with an orbiting planet

**Light Sensor** – Visitors had no problem walking right up and knowing to turn the gear crank. About 40% of visitors connected the activity with the graph; less connected the mystery box with its graph. Many enjoyed and understood the concept by interacting with the gearbox, although the turn crank on the prototype was difficult for most people to operate. The mystery box needs a clearer connection to the activity; people did not tend to look into the box long enough to notice the light dimming. Some felt the mystery box light was blinding. Few visitors actually changed out the positions or the planets on the dowels.

Recommendations:

- 1) Add the suggestion to change out the 'planets' to see how the graph changes, thus deepening understanding of the connection between the activity and the graph.
- 2) Make the handle somewhat easier to turn.

- 3) Replace mystery box with a real graph scientists are analyzing, or develop a question that encourages visitors to better connect the gearbox activity with the mystery box.

**Glare** – Most visitors that spent time with this mystery box really liked it, and didn't need to read much to understand the concept. The challenge was to entice visitors to check it out – it was probably the least visited prototype. Students seemed to get the concept but were only mildly interested.

### **Planet Families**

This component was definitely the most enjoyed by children and adults alike. It was often mobbed and had people staying at it for long periods of time. There was some trial and error getting started, as some visitors pressed 'go' to start rather than dragging over planets, but generally visitors did not need help. Visitors enjoyed doing the "Try This" button. Very few people looked at or used the data in the upper right corner, unless it was pointed out to them.

Recommendations:

- 1) Replace 'go' with "start orbiting" or 'orbits go'
- 2) Multiple stations of same component for final exhibit to support popularity.

## SECTION TWO: STARS

### **Cosmic Collisions**

This component had the least amount of testing, as it was largely non-operational in North Carolina, and, very quickly after it was received in Denver, the new gun ceased functioning. The two-trigger system was confusing for most – people expected that when they pulled the lower trigger (the one their finger was most likely to initially land on) the gun would shoot smoke. It was an aesthetically pleasing prototype, but many didn't get the connection to space, possibly because participants were at the ends of the exhibit concentrating on shooting the guns, and weren't able to see the explanations in the middle, or the front view of the collisions. Practically, there was a concern from security about the smoke setting off smoke alarms, which may need to be addressed up front with clients. This component needs further development and testing prior to becoming a permanent piece.

Recommendations:

- 1) Ensure the 'guns' will withstand heavy usage.
- 2) Make firing the smoke rings a simpler, one step process
- 3) Place connecting text piece to explanatory text at firing locations.

### **Spin Buster**

Visitors had no problem sitting down and immediately spinning the dial – they were impressed with the images and enjoyed manipulating them. People generally liked the pictures, animation and controller, but did not understand what exactly they were supposed to be viewing. Even those that guessed it was about star formation wanted access to more in-depth info on what kind of star, what were the white dots, labeling for the phases of star formation, etc.

Recommendations:

- 1) Add explanatory and contextual information.

### **Seeing through Gas & Dust**

Note: this component was tested in Denver only.

This was the least successful of all the prototypes. It was not interactive enough for visitors; they wanted an activity that went along with it. People did not realize they were seeing a live video image when looking at the screen and those that understood the concept assumed that the demo was ‘faking’ the resistors because they couldn’t see or feel them.

Recommendations:

- 1) Interpretation needs to go further to help visitors understand what is happening.
- 2) Visitors need the opportunity to feel the heat they cannot see without the infrared camera
- 3) Visitors want the opportunity to interact with the camera set up – for instance to interrupt the image with something or to note the image is not interrupted with a green garbage bag, etc.

### **Ignite a Star**

Visitors didn’t seem to have any problem getting started on this one, especially children. This is a very good exhibit for younger visitors because of physical activity. Information was interesting and clear to most visitors. The final exhibit would benefit with a more dramatic end response.

## SECTION THREE: LIFE

### **What Are We Listening For?**

Note: This component was tested in Denver only.

Visitors had no problem sitting down and getting started pushing buttons. Visitors were also clear on the connections between sounds and graphs as well as the need to flip up the graph to answer the question of natural or intelligent. There was a suggestion to adjust the volume some of the sounds. This prototype was particularly appealing to teen-aged or older visitors who would take the time to listen and guess the answer. Younger visitors didn’t have the patience and were often just interested in replaying the loudest noises. Kids completed the activity more successfully when an adult was facilitating.

Recommendations:

1) Add multiple earphones to allow for independent volume adjustments and to make it more engaging for children.

### **Ask a SETI Scientist**

Note: This component was tested in Denver only.

Visitors we spoke to understood this was going to be in video format. Most found the first two questions very engaging (What are you listening for and Have you found anything yet) the last two questions were the least popular (How to get a job and Why Are we doing this). This prototype was not very engaging for younger audiences. Adults read both layers of information on most of the tabs. Rather than finding the amount of information too much, they were interested in knowing additional information such as: What are the parameters for life on a planet (water, atmosphere, what else). Numerous visitors cautioned us that the videos would feel too much like talking heads, which would be boring.

Recommendation:

1) Use the photographs of the scientists to personalize the information, but add videos as a way to see additional, related images rather than to watch people talking.

### **Life Scanner**

Visitors were often unsure on how to get started. They would put their hand on the scanner and expect things to start. Eventually they discovered the ‘scan’ button, but a more obvious approach would be better. Parents and children really like this one when participating together. Visitors felt it didn’t make a clear connection between this interactive and looking for microbial life or looking for life in space.

Recommendations:

- 1) Make the handprint a click button that actually activates the scanner.
- 2) Clarify the connection between this component and the search for life.

### **Is it Alive?**

Very few visitors stayed with this one for long, many just passed it by after reading the first screen. Most felt it was geared toward an older audience and required specific prior knowledge. Complaints were that the info being delivered was very narrow, the speaker was difficult to understand and the questions weren’t engaging. Visitors wanted more focus on the bigger picture, ‘Why is this important?’ and ‘What is the connection with space?’ rather than honing in on the details of the mat research. Many visitors were looking for an ‘animal’ in the tank and didn’t automatically connect it with the *Is it Alive?* computer screen. North Carolina felt that a less aromatic life form might be preferable, however, the olfactory component might help engage younger audiences, which was a problem in Denver.

Recommendations:

- 1) This component would benefit from ideas to make it more engaging such as: making it a touch screen, having a child's voice speak the questions rather than click on them.
- 2) As this component will eventually have 2 additional life forms, create five questions for each life form, focusing on the connection to space exploration.