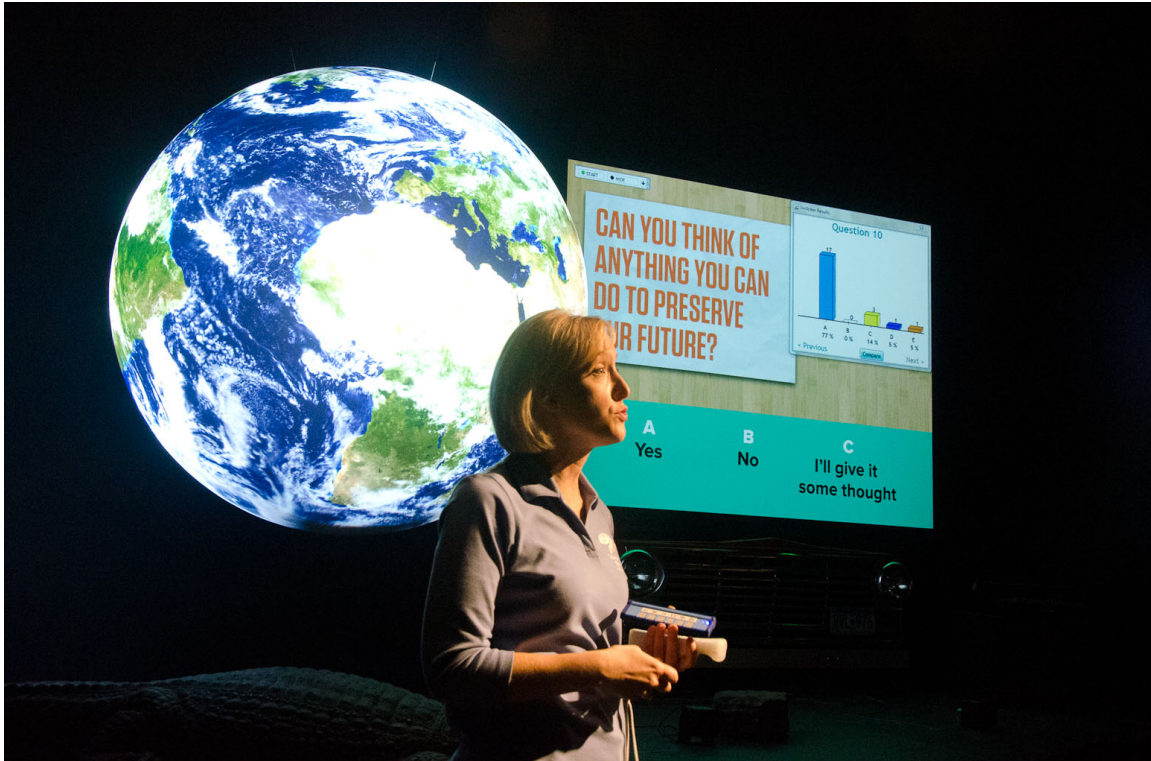


# Planet Earth Decision Theater

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## Summative Evaluation



Photograph from a Planet Earth Decision Theater presentation at the Science Museum of Minnesota.

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Prepared on September 19, 2014

Department of Evaluation and Research in Learning at the Science Museum of Minnesota

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Department of Evaluation and Research in Learning  
Science Museum of Minnesota

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## Certification of Summative Evaluation

Date: 10 December 2014

To: Patrick Hamilton, Science Museum of Minnesota  
PI, Planet Earth Decision Theater

From: Christopher Federico, University of Minnesota  
External Evaluation Certifier

Re: Certification of Summative Evaluation

This is the formal certification of the summative evaluation of the Planet Earth Decision Theater (PEDT) exhibit components funded by the NOAA Environmental Literacy Grant for Science Education. My role in this project has been to advise on the methodology of the evaluation, monitor its progress during implementation, and review the final report of the summative evaluation team. This process is designed to provide the evaluation team and NOAA with a mechanism for assessing the objectivity and validity of the PEDT evaluation and for providing wider context for the evaluation activities and findings.

During the beginning of this process, I engaged in conversation with the evaluation team about the pre-retrospective methodology that they proposed. At first, I was concerned that visitors might want to represent themselves as having learned something, regardless if they did or not. However, the team changed their pre-retrospective questions to measure visitor hope and perceived human impact on the Earth; two subjects that I felt were less susceptible to self-presentational biases. I think this was a suitable methodology to answer the museum's questions and that it fit very well with their informal educational setting.

I also advised the evaluation team throughout the data collection process and during their reporting. While the original sample size goals for some components were not met, the samples were large enough to draw the kinds of conclusions that the team reports on here. During the writing phase, I pointed out relevant literature that the team should review and gave them feedback on their draft. They have incorporated my feedback and have written a summative evaluation that I can certify with confidence.

I, Christopher Federico, hereby certify the summative evaluation of the Planet Earth Decision Theater exhibit components funded by the NOAA Environmental Literacy Grant for Science Education.

Sincerely,



Christopher Federico  
Associate Professor  
Departments of Psychology and Political Science  
University of Minnesota  
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## Introduction

### ***NOAA Environmental Literacy Grant gave SMM an opportunity to communicate key ideas to the public.***

In 2010, the National Oceanic and Atmospheric Administration awarded the Science Museum of Minnesota (SMM) an Environmental Literacy Grant for Science Education. Over the course of four years, SMM's Planet Earth Decision Theater project developed new Science on a Sphere (SOS) programming, films and other scientific visualizations all intended to increase public understanding of the major role that humanity now plays in creating large-scale global change.

The first completed outcome of the grant was the development of a facilitated public program by the same name, Planet Earth Decision Theater (PEDT), that was performed in the new enclosed SOS theater within SMM's Future Earth exhibit. This live program premiered the use of interactive iClickers at SMM to promote visitor participation.

As part of the Planet Earth Decision Theater project, SMM had planned to create one long (~10 minutes) SOS film explaining how humans are now the dominant agents of global change. However, conversations with other members in the SOS Users Collaborative Network revealed that some institutions were concerned about the way visitors seemed to be using their longer SOS films. Members observed that visitors tended to watch longer films for a few minutes before leaving the area to do something else and expressed a desire for more short-length films that would allow visitors to have a brief, impactful visit to the SOS. In response to this suggestion by the field, SMM created four new short SOS films on different aspects of global change and humanity's role in it, instead of one longer film.

The grant also supported the development of a Multi-Touch Table (MTT) that allows visitors to simulate the implications of rising sea levels and storm surges on Baltimore's Inner Harbor in order to understand the impact of global change on coastal communities. Finally, the grant made possible the repurposing of several SOS visualizations for a Magic Planet (MP), so that museum visitors could individually select and explore global visualizations that reveal human impacts on the planet.

## Four outcomes of the Planet Earth Decision Theater grant

All four of the grant's outcomes use data visualization technologies to communicate different messages about humanity's impact on the planet. Below are short descriptions and main messages for each of the four components created through the PEDT project.

**Planet Earth Decision Theater (PEDT)** has the same title as the grant, and is a facilitated presentation that displays images on both the Science On a Sphere and a nearby wall. Visitors participate by using iClickers to answer questions about their own knowledge and beliefs throughout the presentation. The facilitator leads visitors through a presentation of spherical data projected on the globe, while asking visitors for their input and sharing the results of their iClicker voting.

The main messages of the PEDT presentation are:

- *Humans are the dominant agent of global change.*
- *Humans can impact the planet in a positive or negative way.*
- *I feel hopeful about what humans can do to help the earth.*

**Science On a Sphere films (SOS)** are a series of four films created specifically for display on the sphere. Each film uses either a presentation or narrative format, and includes stories and information about topics relating to how humans have changed the earth. The films run on a continuous loop in the PEDT presentation space.

The main messages of the SOS films are:

- *Humans have made a big impact on the Earth in the last few hundred years.*
- *Humans have affected the Earth's land, oceans, and atmosphere.*
- *We have the potential to solve Earth's problems, because we are the best educated, connected and innovative population in history.*

The **Multi-Touch Table (MTT)** is a large, horizontal table displaying an aerial image of Baltimore's Inner Harbor. The visitor interacts with the screen by looking down at the table, and by using his or her fingers to explore the map. On the left hand side of the screen, text explains the effect of flooding based on the relationship between two variables; sea level rise and storm surges. Visitors can change what degree of sea level they wish to see (the current sea level, one foot higher, two feet higher and three feet higher – predicted to be in 2100) and the intensity of a storm (no storm, small storm, large storm). As visitors change these variables, the water levels rise and cover sections of the Inner Harbor. When a small or large storm is selected, the flooding of the inner harbor becomes more significant and the water color changes to yellow and red to indicate the severity. Several location pins highlight major Baltimore landmarks and are occasionally accompanied by text panels that describe the impact of past storms.

The main messages of the MTT are:

- *Sea level rise and storm surges are related to each other.*
- *Sea level rise increases the impact of storm surges on [Baltimore][cities on the water].*
- *[Baltimore] [cities on the water] are vulnerable to flooding as sea levels rise.*

The **Magic Planet (MP)** is a small, tabletop mounted, internally illuminated sphere. With the aid of an adjacent flat screen display, visitors can select what global scientific visualizations they would like to see displayed on the sphere, such as global areas of cropland, global rail networks, or earth at night. Visitors can choose to stop the rotation of the scientific visualizations if they want to examine them more closely.

The main messages of the MP are:

- *Humans have made big changes to Earth.*
- *Global displays help us see large-scale patterns of human impact.*

## **Different museums create different contexts for the PEDT outcomes**

### ***PEDT show in an open-concept space at MSC, and an enclosed theater at SMM***

SMM contracted with the Maryland Science Center (MSC) in Baltimore to receive copies of two deliverables that SMM had created; the PEDT facilitated show and the MTT. At MSC, the Science On a Sphere is a floating centerpiece in the darkened room that precedes a larger space-themed exhibition and planetarium. The room has multiple entry points and an area of benches along one curved wall where several visitors may sit and watch the SOS programming.

For the PEDT facilitated show, visitors are encouraged to sit in this area while a facilitator stands behind a nearby podium and runs the program. MSC has a large portable touchscreen display, requiring the facilitator to move back and forth from the podium to the screen in order to progress through the show and display visitor voting. At SMM, the PEDT show occurs in an enclosed theater space with tiered seating facing the SOS. The facilitator stands facing the audience and advances through projections that are displayed on the SOS and a nearby flat wall by using a clicker.

### ***The MTT features sea level rise in Baltimore – a good fit for MSC***

The current version of the MTT allows visitors to manipulate rising sea levels and add storms to see the effects on Baltimore’s Inner Harbor, which is home to the Maryland Science Center and several other notable landmarks and institutions. Visitors can see how changing sea levels and storm surges may influence places that they can see and may have a connection to right outside of the MSC building.

### ***At SMM, the PEDT outcomes are a part of the Future Earth exhibit***

At SMM, all four of the PEDT outcomes are situated within a larger exhibit, called Future Earth. The entire exhibit includes hands-on manipulatives, text panels, videos, and an interactive computer-based game, all of which reinforce the two big ideas at the heart of the exhibition.

The big ideas of the Future Earth exhibit are:

1. *Humans have a lot of impact on the Earth.*
2. *Humans have the potential to solve Earth’s land, air and water problems.*

Placing the Planet Earth Decision Theater outcomes within an exhibit of reinforcing messages may affect how visitors experience and understand these components. At the time of the evaluation, MSC housed both of their PEDT components near the entrance to their space-themed exhibit, without components that supported their messaging.

A separate evaluation of the overall Future Earth exhibit is being conducted by Joe Heimlich at The Ohio State University and will be available in late 2014.

## **Evaluation Plan**

### **Goals for the four PEDT outcomes**

#### ***Engaging experiences highlighting humanity’s role in global change***

The goal of SMM’s PEDT team was to create interesting and enjoyable interactive experiences that would highlight two big ideas:

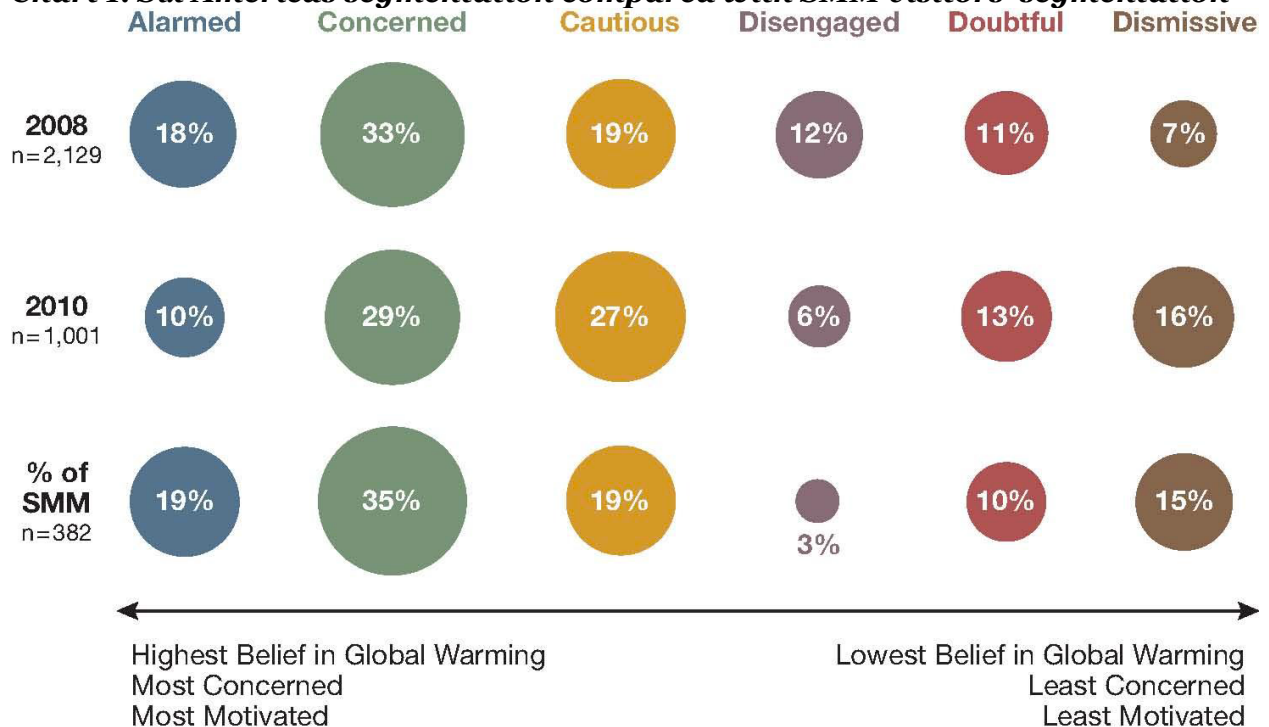
- a) *humans are the dominant agents of global change, and*
- b) *humanity has the potential to solve Earth’s land, air and water problems.*

#### ***Deliverables that target the “movable middle”***

SMM’s PEDT team also wanted to make a difference in how museum audiences understand and think about human impact on the planet. In particular, they sought to tailor PEDT messaging to people who are undecided or unsure about the presence, effects and causes of climate change. Categories from the Six Americas project and staff from George Mason University’s Center for Climate Change Communication helped guide the process of understanding which visitors to direct SMM’s messaging towards.

In 2009, the Six Americas project sampled a large, nationally representative sample of American adults and categorized their viewpoints on global warming into six segments: Alarmed, Concerned, Cautious, Disengaged, Doubtful and Dismissive (Yale Center on Climate Change, 2009). Each segment is roughly defined by how much a person believes global warming is happening, how personally concerned they are, and how motivated they are to take action. In addition, thoughts about what causes global warming and how confident they are in their beliefs contribute to determining a global warming profile. Since then, the project has sampled the public several more times, refining each group’s characteristics and size (see Leiserowitz et al., 2013). A survey of SMM’s adult visitors in 2009 and 2010 indicated that its visitors mostly paralleled the results of the national Six Americas study (see Chart 1; reproduced from the NOAA PEDT grant proposal and based on work by Phipps, 2011).

**Chart 1. Six Americas segmentation compared with SMM visitors’ segmentation**



Proportion represented by area

Source: Yale Project on Climate Change (2008, 2010); Science Museum of Minnesota (% SMM)

SMM consulted staff from George Mason University’s Center for Climate Change Communication (GMU) who suggested that SMM target their messaging to visitors who are more likely to be persuadable around the issue of climate change. They indicated that three of the Six Americas segments (the Cautious, Disengaged and Doubtful) may form a “movable middle” of people who have a shaky knowledge base about global warming and have lukewarm feelings about its impact. Staff at GMU suggested that people in the Movable Middle are much more likely to change their beliefs and augment their understanding about global climate change when presented with new information than their counterpoints who are firmly established on either end of the global warming belief continuum (the Alarmed and the Dismissive). The Concerned were not included as a target segment because they already have a rational understanding of global warming and believe that it is an important issue.

### ***Components for teens and adults***

While SMM's PEDT team hoped to engage visitors of all ages, the messaging for the PEDT outcomes was targeted to teens and adults. Based on years of exhibit development experience, the team felt these audiences were better prepared to grasp global-scale concepts.

### **Evaluation Questions**

With these goals in mind, the evaluation team drafted the following questions to guide the summative evaluation of the PEDT outcomes.

1. Are the components interesting and enjoyable?
2. Are visitors aware of the components' main messages?
3. Do visitors, especially those in the Movable Middle, show a shift in acceptance of the two big ideas behind the Future Earth exhibition?
  - a. Humans have a lot of impact on the Earth.
  - b. Humans have the potential to solve Earth's land, air and water problems.
4. What role does the context of the exhibit components play in their success?

### **Creating the right tools to answer our questions**

The evaluation team created a survey for each component, but the surveys were almost identical with the exception of some small language changes and a unique question to ascertain which films people saw on the SOS (see Appendix A to review a sample instrument from the PEDT component).

First, we asked two close-ended questions that had visitors rate their enjoyment of and interest in each of the four PEDT components on a four-point scale. We followed that with an open-ended question; "What do you think the museum was trying to show with [this component]?" After discussions with SMM's PEDT development team and with other members of the research and evaluation department at SMM, the evaluation team defined success as having at least 70% of visitors walk away with at least one main message of the component. That is, we expected at least 70% of visitors to articulate something in line with one of that component's goals or with one of the Future Earth exhibit's big ideas. This was based on the collective best practices and knowledge of the staff we consulted, with the understanding that learning in a free-choice environment like a science museum has very different goals than learning in a formal classroom.

Then, in order to see if the PEDT outcomes were having an effect on the Movable Middle, we asked two sets of questions. The first set was a short selection of questions from the Six Americas questionnaire that asked visitors to rate their understanding of what causes global warming, how important of an issue it is to them and how worried they are about the future (see the Yale Project on Climate Change Communication, 2009). We created a descriptive coding rubric based on the Six Americas segments to help us identify those at either extreme of global warming belief/disbelief, and those of our target audience in the Movable Middle (see Table 2 for this coding rubric). The second series of questions used a pre-retrospective survey technique to establish shifts in visitors' acceptance of the two big ideas behind the Future Earth exhibit and the four NOAA outcomes. This technique allowed visitors to reflect on their own experience and report if there had been any change in their understanding or beliefs since experiencing a component (see a sample instrument in Appendix A). We conducted a Wilcoxon-signed rank test on the pre-retrospective responses to uncover any significant shifts in acceptance of the two big ideas.



Since the context surrounding the exhibit components was so different at the Maryland Science Center and the Science Museum of Minnesota, we decided to evaluate the PEDT show and the MTT at both locations. We included a question on the surveys for both of these components where visitors selected how many “Earth-focused” exhibits they had seen already today. That question, in addition to an analysis of aggregate differences between the two samples at SMM and MSC could reveal if visitors experienced an enhanced understanding, enjoyment or interest in the components because they are: 1) using the MTT in Baltimore at the MSC where the table’s content is based, or 2) experiencing the NOAA components along with several other reinforcing exhibit components within SMM’s Future Earth exhibit.

Finally, we asked a short series of demographic questions to ascertain if we were hearing from visitors in our target age range (14 and older), as well as to help us understand our audience. Our external evaluation certifier, Dr. Christopher Federico, made us aware of research which suggests that highly educated, politically conservative, older white males are particularly reluctant to shift their thinking about global change when presented with new information (Kahan et al., 2007), and suggested that we include demographic questions in our study so that we could figure out if this population segment made up a large percentage of our sample. If so, it may indicate that: a) our sample was not reflective of the general SMM audience, whose “typical” visitor is a highly educated, white, middle-class woman with a young child (Cohn & Van Cleave, 2012), and b) that we may not see the impacts that the exhibit components are capable of effecting because we are hearing from people who are not likely to change their minds. So, we included questions about gender, age, ethnicity and education on the survey, because we wanted to understand if our results were influenced by this audience segment. However, we decided not to include questions about political leanings because staff thought that visitors would have a strongly negative reaction to being asked that by the institution.

### **Collection methodology**

To answer these questions, we sampled teens who appeared to be 14 or older and adults at each of the four PEDT outcomes. We studied each outcome separately for two reasons; 1) visitors might not encounter all four outcomes, and 2) each outcome has two to three unique main messages, even though they all deal with humans as agents of global change.

At both sites, data was collected through surveys that visitors filled out themselves. Data collectors approached eligible visitors near the component being evaluated and asked them to try out the exhibit for as little or as long as they wanted, and then to fill out a short survey afterwards.

## **Findings**

### ***530 surveys from SMM and MSC***

From June through August of 2014, we collected a total of 530 surveys from the four PEDT outcomes at both SMM and MSC (see Table 1). We had also planned to collect 75 surveys from visitors at the PEDT facilitated program in Baltimore, but adapted our evaluation plan after arriving at MSC to not include this sample. Both the facilitation and the technical set up of the show at MSC were different, which seemed to affect visitor engagement and prolong the show to almost twice its intended length (~30 minutes). Also, at the time of our visit, the PEDT show was not in regular rotation and the presenter had not facilitated the show for several months. We decided not to collect data from the PEDT presentation at MSC, as it would not have been an accurate representation of the PEDT outcome originally developed by SMM.

***Table 1. Total surveys collected for PEDT outcomes at both museums***

	<b>Total</b>	<b>SMM</b>	<b>MSC</b>
<b>PEDT</b>	90	90	-
<b>SOS films</b>	125	125	-
<b>MTT</b>	156	77	79
<b>MP</b>	159	159	-

***Mapping visitors to categories inspired by the Six Americas study***

In order to understand which visitors were likely to be in the Movable Middle, we developed a set of survey questions and a coding rubric to apply to their responses. All surveys included questions adapted from the Six Americas questionnaire to assess visitors' views on global warming. The extensive original survey was simplified for this evaluation to four questions reflecting the essential dimensions: if global warming is happening, the main cause of global warming, how alarming the issue is, and how important the issue is. We crafted the description paragraphs below (see Table 2) from our understanding of the Six Americas categories and how they might apply to these broader categories of people in our current study. These paragraphs served as our guide as we created a codebook that includes all of the responses we received from visitors to these questions and codifies them into these three categories: Believers, Movable Middle, and Disbelievers. These categories mapped onto the original six categories by collapsing the Alarmed and Concerned into the new Believers category, and consolidating the Cautious, Disengaged and Doubtful into the Movable Middle. The Dismissive category was the only one we categorized as Disbelievers.

**Table 2. Our rubric: Understanding our coding from the lens of the Six Americas study**

Six Americas	Current Study	Description
Alarmed	Believers	Believe that global warming is probably happening, and know that it is at least partially due to humans. They are worried about it and they think that global warming is important to them, personally.
Concerned		
Cautious	Movable Middle	May or may not think that global warming is happening, and tend to be unsure of the cause if they do. They tend to worry about it a little and think it is at least a little importance to them, personally.
Disengaged		
Doubtful		
Dismissive	Disbelievers	Do not believe that global warming is happening. If asked to attribute the causes of global warming, they either deny that it's happening outright, attribute it to natural causes or indicate that they are not sure about the cause. They harbor little or no worry about it. They also tend to rank it of little or no importance to themselves, personally.

When we analyzed our visitor responses using these paragraphs as a guide, we found that the Movable Middle was the largest visitor category at SMM and MSC (see Table 3). When we applied our three segments to the national data from the 2012 Six Americas study, we found that there are fewer Believers in the SMM and MSC sample, and more visitors in the Movable Middle and Disbelievers categories (Yale Project on Climate Change, 2012).

**Table 3. Visitors views on global warming**

	Believers	Movable Middle	Disbelievers
SMM and MSC (n=476)*	32%	57%	20%
2012 National Sample (n=1,058)	45%	51%	8%

\*This sample is lower than total visitor responses reported earlier because some responses to global warming questions were blank.

**PEDT outcomes were interesting and enjoyable**

Most visitors found the PEDT outcomes to be interesting and enjoyable (see Tables 4 & 5). The PEDT facilitated show had the highest enjoyment rankings, with 51% of visitors ranking it as “very enjoyable” and almost all of the rest ranking it as “enjoyable”. The MTT seemed to lag behind the others, in terms of enjoyment and interest, while still being successful overall. Three-

fourths of visitors ranked MTT as “enjoyable” or “very enjoyable” and four-fifths of visitors ranked MTT as “interesting” or “very interesting”.

**Table 4. How enjoyable visitors found the four PEDT outcomes**

	<b>PEDT (n=90)</b>	<b>SOS Films (n=96)</b>	<b>MTT (n=156)</b>	<b>MP (n=155)</b>
Very enjoyable	51%	30%	15%	34%
Enjoyable	47%	66%	58%	54%
A little enjoyable	2%	4%	26%	12%
Not at all enjoyable	-	-	1%	1%

**Table 5. How interesting visitors found the four PEDT outcomes**

	<b>PEDT (n=90)</b>	<b>SOS Films (n=96)</b>	<b>MTT (n=156)</b>	<b>MP (n=155)</b>
Very interesting	52%	49%	28%	46%
Interesting	46%	48%	56%	45%
A little interesting	2%	3%	15%	9%
Not at all interesting	-	-	1%	-

***Baltimore location had an effect on enjoyment and interest for the MTT***

MSC visitors rated the table as more enjoyable than their counterparts at the Science Museum of Minnesota, with a significance of  $p < 0.005$ , as assessed with a Student’s t-test (two-tailed test, assuming equal variances). Table 6 below shows that about one in four visitors at MSC rated the exhibit as “very enjoyable”, while only 6% of visitors at SMM did so.

**Table 6. “How enjoyable was using the table?” (n=156)**

	Total for both sites	SMM only	MSC only
Very enjoyable	15%	6%	23%
Enjoyable	58%	58%	58%
A little enjoyable	26%	35%	16%
Not at all enjoyable	1%	-	3%

Visitors at MSC were also more interested in the MTT than SMM visitors ( $p < 0.03$ , two-tailed test, assuming equal variances). Table 7 below shows that about two-fifths of MSC visitors rated the MTT as “very interesting”, while only one-fifth of visitors at SMM gave the same rating.

**Table 7. “How interesting was using the table?” (n=156)**

	Total for both sites	SMM only	MSC only
Very interesting	28%	19%	37%
Interesting	56%	61%	51%
A little interesting	15%	19%	11%
Not at all interesting	1%	-	1%

***Equally enjoyable, but less interesting for doubters of global warming***

When we looked to see if visitors’ beliefs about global warming were correlated with how they rated their interest and enjoyment of the PEDT outcomes, there was practically no difference in how each population segment rated their enjoyment. Visitors who do not believe global warming is happening, however, were slightly less interested in the PEDT outcomes than their counterparts.

**4 out of 5 visitors mention relevant messages about each PEDT outcome**

As described earlier, each PEDT outcome tried to impart two or three main messages. While these messages were somewhat related to one another and supported by the broader messages of the Future Earth exhibition, each PEDT outcome gave visitors a different way to explore those larger messages.

We began by coding visitors’ open-ended responses to the question, “What do you think this exhibit was trying to show?” by assessing if they mentioned all of the points from one or more of

the main messages in their answer (see Table 8 for a complete list of the main messages for each component, along with the coding rubric that we eventually adopted).

Coding within this strict framework was limiting, in part because it meant that visitors provide a complete answer with content and causality. For example, a valid response on the MTT for whether or not a visitor fully articulated the third main message (“Baltimore (or cities on the water) are vulnerable to flooding as sea levels rise.”), would have to include each part of that main message. They would have to mention: 1) Baltimore or another coastal city or coastal cities in general, 2) that these cities are in danger, 3) that the specific threat to these cities is flooding, and 4) that the flooding is due to sea level rise. For comparison, a visitor who seemed to walk away with the main message when they wrote, “How storms and sea level could impact the area,” would *not* have qualified under this strict coding methodology. Since this methodology left out many responses that seemed relevant to what the PEDT development team was trying to elicit, we knew we had to adjust the way we were interpreting visitor responses.

To explore how we might code visitors’ responses more broadly, we coded in two phases. First we asked a researcher who was not involved in the survey development to do emergent coding and create whatever categories seemed reasonable. This allowed us to see the data more holistically and to recognize that many visitors wrote responses related to the topic of global change, but with varying degrees of specificity about the scientific processes embedded in the PEDT outcomes.

Next, we identified codes that reflected the three most common themes that were also the most relevant to the overarching main messages of the PEDT outcomes. Those themes are:

1. The impact of humans on the planet.
2. The impact of climate change (or global warming) on the planet.
3. The need to make changes or take action to counteract these changes.

As Table 8 demonstrates, these broad themes span the main messages of nearly all of the PEDT outcomes. Messages coded in purple correspond to human impact, messages in blue correspond to the impact of climate change, and messages in orange correspond to a need to take action or make changes.

**Table 8. Main messages for exhibit components**

<b>Planet Earth Decision Theater</b>	<b>Science On a Sphere</b>	<b>Multi-Touch Table</b>	<b>Magic Planet</b>
<i>Humans are the dominant agent of global change.</i>	<i>Humans have made a big impact on the Earth in the last few hundred years.</i>	<i>Sea level rise and storm surges are related to each other.</i>	<i>Humans have made big changes to Earth.</i>
<i>Humans can impact the planet in a positive or negative way.</i>	<i>Humans have affected the Earth's land, oceans, and atmosphere.</i>	<i>Sea level rise increases the impact of storm surges on [Baltimore][cities on the water].</i>	<i>Global displays help us see patterns of human impact.</i>
<i>I feel hopeful about what humans can do to help the earth.</i>	<i>We have the potential to solve Earth's problems, because we are the best educated, connected and innovative population in history.</i>	<i>[Baltimore] [cities on the water] are vulnerable to flooding as sea levels rise.</i>	

\*Key: **PURPLE** = The impact of humans on the planet. **BLUE** = The impact of climate change (or global warming) on the planet. **ORANGE** = The need to make changes or take action to counteract these changes.

**Visitors were most likely to mention the impact of human activity**

Visitor responses were sometimes coded into two categories if they sufficiently addressed multiple themes. Therefore, Table 9 below reflects the number of responses that included reference to any of the main themes (human impact, impact of climate change, or a need for action). Some PEDT outcomes did not receive any comments aligned with these main themes. For example, visitor responses to the Multi-Touch Table primarily referred to the interactive display of information, not about human impact on those variables. Codes that fell outside of these main themes will be discussed later.

Visitors to the PEDT were most likely to talk about the impact humans have made on the planet, but both the MP and SOS films conveyed this message to over 40% of visitors (see Table 9). PEDT show visitors were less likely to mention climate change or global warming by name, perhaps because the link to human activity is most explicit in the PEDT show. For examples of how we coded responses from the components into each of these themes, please see a short selection below Table 9. The full list of open-ended responses to each of the PEDT outcomes is available in Appendix B.

**Table 9. “In your own words, what do you think the museum was trying to show with [this PEDT outcome]?”\***

	<b>PEDT</b>	<b>SOS Films</b>	<b>MTT</b>	<b>MP</b>
	<b>(n=77)</b>	<b>(n=91)</b>	<b>(n=158)</b>	<b>(n=147)</b>
Human Impact	60%	45%	-	41%
Impact of Climate Change	16%	29%	21%	-
Need for Action	26%	24%	9%	-

\*Percentages represent the number of open-ended responses that related to one of three major themes; some visitor responses were coded into multiple themes.

### **Sample comments coded to Human Impact**

#### *60% of responses to PEDT*

- Human impacts on Earth.
- Human impact, you should have included the Pacific garbage patch.

#### *45% of responses to SOS Films*

- Be green and eco-friendly. Human impact on the Earth.
- How human activity affects the climate and our environment.

#### *41% of responses to MP*

- The effect humans have on changing the planet.
- I believe that it was trying to show much the Earth has been/is affected by human activity.

### **Sample comments coded to Impact of Climate Change**

#### *29% of responses to SOS Films*

- Climate change.
- Educate people on the effects of CO<sub>2</sub>.

#### *21% of responses to MTT*

- Climate change has potential impact on a large number of people in the United States.
- Climate change is no joke. We need to stop or at least slow down global warming! Future development must take the estimated water levels before building new buildings, roadways, etc.

#### *16% of responses to PEDT*

- Effect of carbon dioxide emissions.
- Climate change, human impact.



### ***Sample comments coded to Need for Action***

#### *26% of responses to PEDT*

- We can do a lot to care for our earth.
- The impact of humans on Earth (land, sea, and air). The ability of humans to be inventive and put their genius to solving our global issues.

#### *24% of responses to SOS Films*

- Conservation.
- Having a sense that it is important to protect the earth.

#### *9% of responses to MTT*

- How devastating climate change is. Personalized it--we can see how it affects our own home area. Get us thinking about how we need to make changes now to avoid this.
- The storms and rising water levels may affect Baltimore's shores and harbor and what might be done to help.

### ***4 out of 5 visitors mentioned relevant topics when asked what PEDT outcomes were trying to show***

As part of our emergent coding process, responses that described elements of the exhibit components other than the three main themes described above were also coded into categories. For each PEDT outcome, one to three additional codes were created. These codes mapped on to the main messages not captured in the three main themes, such as the main messages for the Multi-Touch Table about the relationship between sea level rise and storm surges.

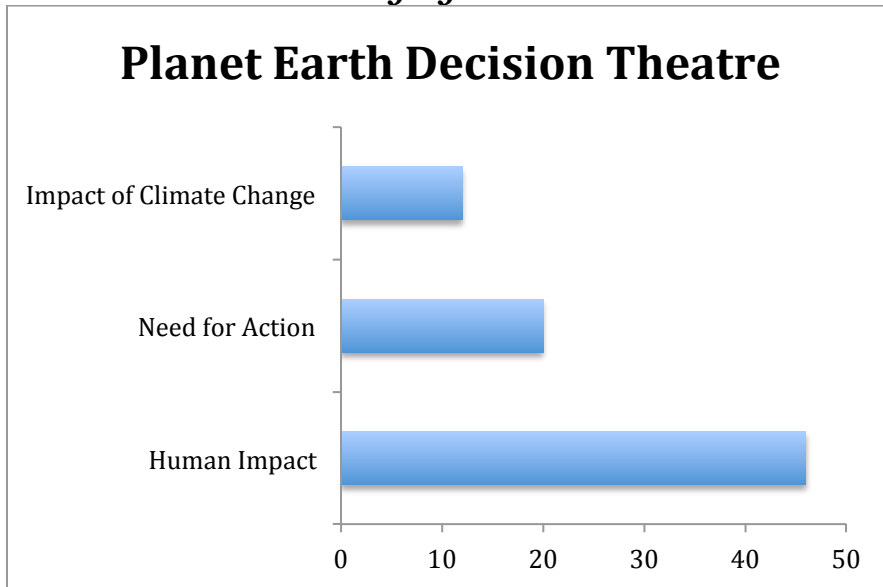
Combining the comments that were coded to the three main themes and the comments coded to the additional main messages, it was clear that the PEDT outcomes were successful in communicating messages to over 70% of visitors. See Table 10 below for an overview of the emergent codes from each PEDT outcome, as well as a percentage of how many visitors articulated at least one of these relevant messages for each PEDT outcome.

**Table 10. Percent of all responses that mention at least one relevant message**

	<b>% of Visitors</b>
<b>Planet Earth Decision Theater (n=77)</b>	
<ul style="list-style-type: none"><li>• Human Impact</li><li>• Impact of Climate Change</li><li>• Need for Action</li></ul>	81%
<b>Science On a Sphere (n=91)</b>	
<ul style="list-style-type: none"><li>• Human Impact</li><li>• Impact of Climate Change</li><li>• Need for Action</li><li>• Oceans and Water</li><li>• Evolving Earth</li></ul>	79%
<b>Multi-Touch Table (n=158)</b>	
<ul style="list-style-type: none"><li>• Impact of Climate Change</li><li>• Need for Action</li><li>• Sea Level Rise</li><li>• Storm Danger</li></ul>	97%
<b>Magic Planet (n=147)</b>	
<ul style="list-style-type: none"><li>• Human Impact</li><li>• Data Visualization</li><li>• Global Comparison</li><li>• Connectedness</li></ul>	93%

The graphs below (see Graphs 1-4) show the coding categories for each PEDT outcome and the number of codes applied to all responses in the sample. For examples of our emergent coding for each PEDT outcome, please see a short selection below each graph. The full list of open-ended responses to each of the PEDT outcomes is available in Appendix B.

**Graph 1. Emergent coding for responses to, “In your own words, what do you think the museum was trying to show with Planet Earth Decision Theater?”**



**Examples of emergent coding for responses to, “In your own words, what do you think the museum was trying to show with Planet Earth Decision Theater?” (n=77)**

*60% (46) Human impact*

- The impact of humans and human activity on earth.
- That as our world has shrunk in terms of connectivity we have increasingly burdened our planet with our activities.

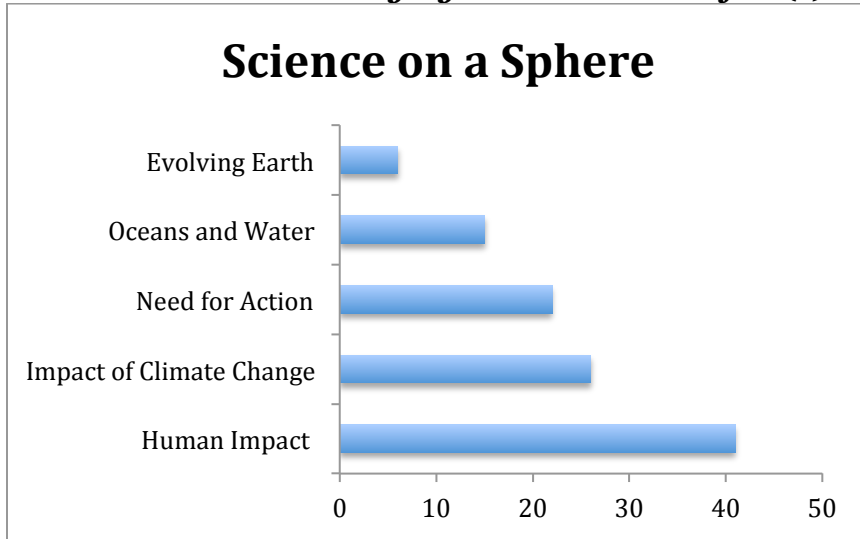
*26% (20) Need for action*

- We are all responsible for our Earth and our own health and life.
- That everyone needs to think about how to make the future better.

*16% (12) Impact of climate change*

- Show the effects of global warming.
- Effect of carbon dioxide emissions.

**Graph 2. Emergent coding for responses to, “In your own words, what do you think the museum was trying to show with the film(s)?” (n=91)**



**Examples of emergent coding for responses to, “In your own words, what do you think the museum was trying to show with the film(s)?” (n=91)**

*45% (41) Human impact*

- Promoting human change or habit changes that [are] necessary for sustainability of life.
- Science and how natural resources are affected by a growing population.

*29% (26) Impact of climate change*

- That climate change affects our food supply.
- That the air and atmosphere is becoming warmer increasingly.

*24% (22) Need for action*

- Having a sense that it is important to protect the earth.
- How feeding the growing population of the world may pose a problem for society, and efficiency with crop growing might help solve the problem.

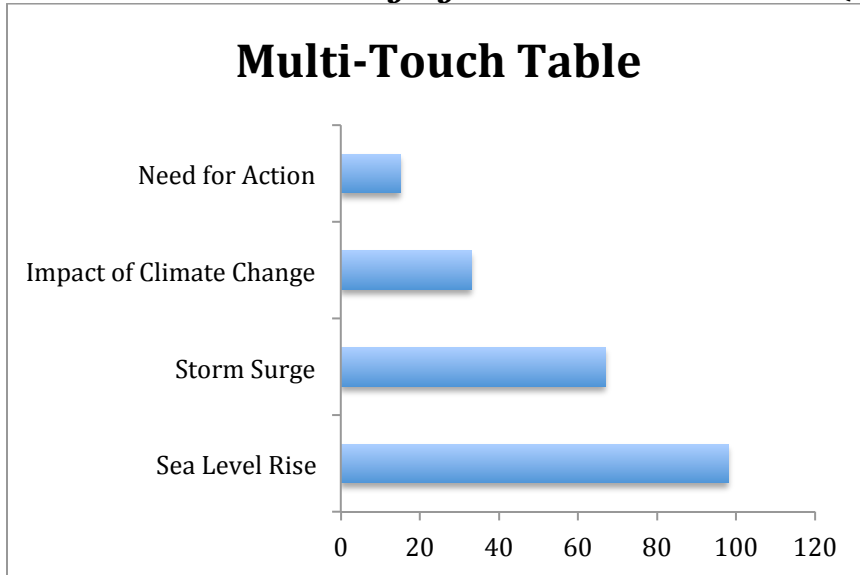
*16% (15) Oceans and water*

- How humans have impacted the ocean life.
- How important water is to us.

*7% (6) Evolving Earth*

- Earth change.
- How earth has evolved and how we need to take care of it.
- Global effect of our (local) activity.

**Graph 3. Emergent coding for responses to, “In your own words, what do you think the museum was trying to show with the table?” (n=158)**



**Examples of emergent coding for responses to, “In your own words, what do you think the museum was trying to show with the table?” (n=158)**

**62% (98) Sea level rise**

- Dangers of rising sea level.
- How a change in sea level effects the economy.

**42% (67) Storm surges**

- Damage occurs with storms to the shorelines, flooding occurs with the level of hurricane.
- Effects of storm water on the city.

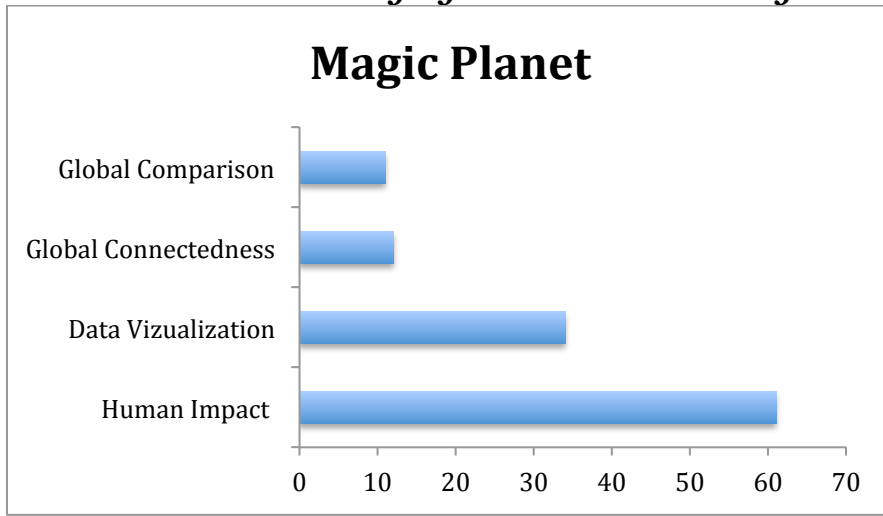
**21% (33) Impact of climate change**

- Climate change has potential impact on a large number of people in the United States.
- Effect of global warming and environmental sea levels. Storm damage changes because of the rising levels.

**9% (15) Need for action**

- Earth changes. How the Earth changes. Future City planning needs.
- How devastating climate change is. Personalized it--we can see how it affects our own home area. Get us thinking about how we need to make changes now to avoid this.

**Graph 4. Emergent coding for responses to, “In your own words, what do you think the museum was trying to show with the Magic Planet?” (n=147)**



**Examples of emergent coding for responses to, “In your own words, what do you think the museum was trying to show with the Magic Planet?” (n=147)**

**41% (61) Human impact**

- How much humans impact the planet.
- Interaction with humans and earth.

**23% (34) Data visualization**

- Show how much power we use.
- Trends around the world in a simple, engaging format.

**8% (12) Global connectedness**

- Connectivity of the world.
- I think it was trying to show how interconnected we are as a planet.

**7% (11) Global comparison**

- How diverse the world is, but still connected by air traffic and Facebook friends for example.
- Where cities and large populations are located, differences in technology between developed and undeveloped countries.

**Believers and those in the Movable Middle are more likely to voice a relevant message than Disbelievers**

We looked to see if visitors’ beliefs about global warming were related to whether or not they walked away with a relevant message from a PEDT outcome. The tables below (Tables 11-14) show the relevant message codes broken out by global warming profile.

In the PEDT show, Believers were most likely to mention the theme of humans making an impact on earth, but were less likely than those in the Movable Middle to mention the impact of

climate change (see Table 11). Believers were also more likely to mention the need to take action than the Movable Middle.

**Table 11. Percent of visitors who saw the PEDT, by global warming category, that mention a main message\*.**

<b>PEDT</b>	<b>Believers (n = 46)</b>	<b>Movable Middle (n = 31)</b>	<b>Disbelievers (n = 5)</b>
Human Impact	63%	36%	100%
Impact of Climate Change	8%	23%	40%
Need for Action	28%	19%	-

\*Some visitors' responses talked about multiple messages, so total percentages may exceed 100.

For the SOS films (see Table 12), Believers mentioned the themes of human impact and climate change much more than either the other two global warming categories. The visitors in the Movable Middle were most likely to make comments about the need for action on climate change, with over half of the category talking about it compared to about one-fifth of either the Believers or Disbelievers. It is also interesting that while no Disbelievers mentioned the impact of climate change explicitly, many saw the effects of human impact in the films and voiced a need for action.

**Table 12. Percent of visitors who viewed SOS films, by global warming category, that mention a relevant message\*.**

<b>SOS</b>	<b>Believers (n = 32)</b>	<b>Movable Middle (n = 54)</b>	<b>Disbelievers (n = 10)</b>
Human Impact	47%	43%	30%
Impact of Climate Change	34%	28%	-
Need for Action	22%	54%	20%
Oceans and Water	13%	19%	30%

\*Some visitors' responses talked about multiple messages, so total percentages may exceed 100.

Believers were more likely than the Movable Middle or Disbelievers to voice examples of the impacts of climate change after using the MTT (see Table 13). All three global warming segments mentioned sea level rise and the danger of storms equally in response to the open-ended prompt, but Disbelievers were the only ones to voice no need for action.

**Table 13. Percent of visitors who used the MTT, by global warming category, that mention a relevant message\*.**

MTT	Believers (n = 50)	Movable Middle (n = 74)	Disbelievers (n = 26)
Impact of Climate Change	34%	15%	15%
Need for Action	10%	12%	-
Sea Level Rise	64%	61%	65%
Storm Danger	40%	45%	42%

\*Some visitors' responses talked about multiple messages, so total percentages may exceed 100.

Believers in global warming were much more likely to mention the effect of human impact on the Earth than the Movable Middle or Disbelievers (see Table 14). They also were most likely to mention the idea of humans being connected all across the Earth. Disbelievers, in comparison, did not mention connections and were most likely to focus on the design and data in the physical object itself.

**Table 14. Percent of visitors who used the MP, by global warming category, that mention a relevant message\*.**

MP	Believers (n = 30)	Movable Middle (n = 100)	Disbelievers (n = 18)
Human Impact	67%	22%	28%
Data Visualization	20%	28%	44%
Global Comparisons	3%	6%	17%
Connectedness	20%	12%	-

\*Some visitors' responses talked about multiple messages, so total percentages may exceed 100.

### **All PEDT outcomes increased visitor ratings of human impact on the Earth**

Our third evaluation question addressed the ability of PEDT outcomes to shift visitor thinking around the two big ideas behind the Future Earth exhibition: that humans have a lot of impact on the Earth and that there is reason to hope that humanity can solve Earth's land, air and water problems.

For all of the PEDT outcomes, visitors were more likely to respond that humans have "a lot of impact" on the Earth after using the exhibit (see Table 15). A Wilcoxon signed-rank test revealed that all of the shifts in visitors' acceptance of this first big idea were statistically significant. PEDT appeared to create the most positive impact; 90% of visitors reflected that they now thought humans have "a lot of impact" on the Earth after seeing the show, compared with 70% ranking it that way before they saw the show.



**Table 15. “How much impact do you think humans have on the Earth?” Statistical significance across PEDT outcomes.**

	PEDT*** (n=86)		SOS films*** (n=96)		MTT* (n=151)		MP*** (n=151)	
	Before	After	Before	After	Before	After	Before	After
A lot of impact	70%	90%	71%	85%	66%	76%	75%	87%
Some impact	29%	11%	25%	14%	29%	17%	23%	11%
A little impact	1%	-	4%	1%	5%	6%	3%	2%
No impact at all	-	-	-	-	1%	1%	-	-

Note: The table above shows a statistically significant increase in overall ratings of human impact for each component. Each component is followed by an asterisk, denoting its p value for the Wilcoxon signed-rank test that showed its significance as: \*\*\*p < .001. \*\* p< .01. \*p< .05

**All of the PEDT outcomes successfully influence the Movable Middle in particular**

Of particular interest is that visitors in the Movable Middle had statistically significant shifts after interacting with all of the PEDT outcomes (see Table 16). When we compared the data for the Multi Touch Table from SMM with MSC, we found that the table was significantly more likely to increase human impact ratings from visitors in both the Believers and Movable Middle categories. Disbelievers had no statistically significant shifts in their thinking after using any component.

**Table 16. “How much impact do you think humans have on the Earth?” Statistical significance by global warming category.**

	PEDT	SOS	MTT	MP
Believers	**		* (at MSC only)	
Movable Middle	*	**	** (at MSC only)	**
Disbelievers				

Each asterisk reflects a significant p value for the Wilcoxon signed-rank test as follows:  
 \*\*\*p < .001. \*\* p< .01. \*p< .05

MTT increases in human impact ratings were only statistically significant in data from the MSC.

When we set up the study, our external evaluation certifier was concerned that older, white males with more education might affect our results, because this demographic category is more resistant to changing their beliefs about global change. However, when we reviewed the 462 cases for which we had complete demographic responses, we found that only 8% of the sample

met these criteria. We feel comfortable that this subset of the population is not overwhelming our sample or masking the abilities of the PEDT outcomes to shift visitors' beliefs about humanity's role in global change.

**The PEDT show and the SOS films increased how hopeful visitors felt about solving Earth's problems**

Visitors to the Magic Planet, Multi-Touch Table and SOS films showed remarkably similar patterns in their degree of hopefulness before interacting with these exhibits, but only the SOS films elicited a statistically significant change in how hopeful they were in solving Earth's problems (see Table 17). The PEDT visitors were generally more hopeful before viewing the presentation and still exhibited a statistically significant increase in their hope ratings after seeing the show.

**Table 17. "How hopeful are you that humans will be able to solve Earth's land, air and water problems?" Statistical significance across PEDT outcomes.**

	PEDT* (n=85)		SOS films* (n=96)		MTT (n=151)		MP (n=151)	
	Before	After	Before	After	Before	After	Before	After
Very hopeful	24%	25%	14%	17%	14%	14%	16%	18%
Hopeful	44%	51%	44%	47%	42%	44%	42%	37%
A little hopeful	27%	22%	35%	31%	34%	32%	36%	34%
Not at all hopeful	6%	2%	7%	5%	11%	11%	7%	11%

Note: The table above shows a statistically significant increase in overall ratings of human impact for the short SOS films and the PEDT show. These PEDT outcomes are followed by an asterisk, denoting their p values for the Wilcoxon signed-rank test: \*p < .05

**PEDT outcomes do not increase hope for the Movable Middle**

When we analyzed these slight shifts in hope ratings using a Wilcoxon signed-rank test, we found that only the SOS films were statistically likely to influence a global warming category of visitors, and these were the Believers; people who already believe that global warming is happening, is important, and is caused by humans (see Table 18).

**Table 18. “How hopeful are you that humans will be able to solve Earth’s land, air and water problems?” Statistical significance by global warming category.**

	PEDT	SOS	MTT	MP
Believers		*		
Movable Middle				
Disbelievers				

\*p < .05

We hypothesized that SMM visitors may experience more of a positive shift in the two big ideas than visitors at MSC, because its MTT is located within the Future Earth exhibit. However, the way we asked about the effect of this context was to have visitors reflect on how many “Earth-focused” exhibits they had seen that day, and this was ineffective in teasing out the difference in visitor experiences at MSC and SMM.

## Conclusion

SMM’s four PEDT outcomes each demonstrate planetary changes as a result of human impact. Utilizing innovative and interactive data visualization technologies, visitors encounter these messages by exploring how earth’s systems work and how humans contribute to these systems. All four components were generally appealing and interesting to visitors. Furthermore, visitors seemed to understand and articulate relevant messages from each PEDT outcome, including the humanity’s impact on the planet, the role that climate change plays in that impact, and the need to take action to solve this crisis. Most striking, all PEDT outcomes caused a shift in visitors’ thinking about the role that humans play in affecting these systems that was statistically significant.

While this study was not designed to compare PEDT outcomes by their effectiveness of communicating messages or engaging visitors, it is notable that the two components with more narration, the PEDT facilitated presentation and the SOS short films, were rated as the most interesting and engaging. Furthermore, they were also the only two outcomes that caused a statistically significant positive shift for visitor thinking about how hopeful they are about humans being able to solve problems related to climate change.

Local contexts and information may be an effective way to communicate, as well. In our comparison of the MTT table, we found that MSC visitors found the table to be more interesting and enjoyable than SMM visitors. MSC visitors were also statistically more likely to think that humans have more impact on the Earth after using the MTT. Visitors at both institutions commented that they would have liked to see other cities displayed, and now that the technology exists, SMM has a unique opportunity to harness local geographical data and integrate it with the multi-touch table to create locally-based experiences for their audience.

Science museums will continue to present visitors with current information about what’s known scientifically about the causes and effects of global warming. This study contributes to the knowledge about how visitors interpret this information and how it impacts their beliefs.

## Acknowledgements

Our thanks to Christopher Federico, who served as our external evaluation certifier, and to the senior research and evaluation staff at SMM. Both provided us with guidance as we tackled the planning, collecting, analysis and reporting of this evaluation. We're also beholden to the staff at SMM and MSC who collected several hundred surveys and made us feel welcome and supported in Baltimore, respectively. Several people at SMM lent their especial guidance and support, including Patrick Cox, Scott Van Cleave, Joseph Schantz, Melanie Wehrmacher (pictured on the first page of the report), Gina Svarovsky, Marjorie Bequette and the summative evaluation meeting group. Finally, thank you Patrick Hamilton and Robert Garfinkle for participating in many meetings about the evaluation and the history of the project. Thank you, everyone.

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## Appendices

A: Sample survey instrument from PEDT component.

B: Our coding for the complete set of open-ended responses to the question, "*In your own words, what do you think the museum was trying to show with this [component]?*"

## Appendix A: Sample survey instrument



# Planet Earth Decision Theater Survey

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### 1. How enjoyable was Planet Earth Decision Theater?

- Very enjoyable
- Enjoyable
- A little enjoyable
- Not at all enjoyable

### 2. How interesting was Planet Earth Decision Theater?

- Very interesting
- Interesting
- A little interesting
- Not at all interesting

### 3. In your own words, what do you think the museum was trying to show with Planet Earth Decision Theater?

On the next page are some ideas about how and why changes happen on our planet.

Please consider what you thought BEFORE visiting Planet Earth Decision Theater, and what you now think AFTER having seen the show.



**4. How much impact do you think humans have on the Earth?**

What did you think <b>BEFORE</b> visiting Planet Earth Decision Theater?	<input type="checkbox"/> A lot of impact	<input type="checkbox"/> Some impact	<input type="checkbox"/> A little impact	<input type="checkbox"/> No impact at all
What do you think now, <b>AFTER</b> visiting Planet Earth Decision Theater?	<input type="checkbox"/> A lot of impact	<input type="checkbox"/> Some impact	<input type="checkbox"/> A little impact	<input type="checkbox"/> No impact at all

**5. How hopeful are you that humans will be able to solve Earth’s land, air and water problems?**

What did you think <b>BEFORE</b> visiting Planet Earth Decision Theater?	<input type="checkbox"/> Very hopeful	<input type="checkbox"/> Hopeful	<input type="checkbox"/> A little hopeful	<input type="checkbox"/> Not at all hopeful
What do you think now, <b>AFTER</b> visiting Planet Earth Decision Theater?	<input type="checkbox"/> Very hopeful	<input type="checkbox"/> Hopeful	<input type="checkbox"/> A little hopeful	<input type="checkbox"/> Not at all hopeful



Perceptions about global warming can shape how people plan for the future of the planet.

We'd like to know more about how you think about the planet.

### 6. What do you think about global warming?

---

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
Global warming <b>is definitely</b> happening.	Global warming <b>is probably</b> happening.	Global warming <b>is probably not</b> happening.	Global warming <b>is definitely not</b> happening.

---

### 7. What do you think is the main cause of global warming?

- Mostly because of people changing the planet.
- Mostly because of natural processes.
- An equal combination of man-made and natural causes.
- I'm not sure what causes global warming.
- Global warming is not happening, so there is no main cause.

### 8. How worried are you about global warming?

- Very worried
- Worried
- A little worried
- Not at all worried

### 9. How important is the issue of global warming to you personally?

- Very important
- Important
- A little important
- Not at all important



This area of the museum has other exhibits about the Earth that you might have seen.

**10. About how many Earth-focused exhibits have you interacted with today?**

- A lot** of Earth-focused exhibits
- A few** Earth-focused exhibits
- One or two** Earth-focused exhibits
- No other** Earth-focused exhibits

**11. Is there anything else you would like to share with us?**

The following questions help us understand more about whom we are reaching with our exhibits.

**12. Your age:** \_\_\_\_\_

**13. Gender:** \_\_\_\_\_

**14. Ethnicity:** \_\_\_\_\_

**15. Zip code:** \_\_\_\_\_

**16. What is the highest level of education you have completed? *Check one.***

- Less than High School
- Completed High School
- Some College or Technical Education
- College Degree
- Post-Graduate Degree

**Thank you for your time!**



## Appendix B: Main Messages Emergent Coding

This appendix includes all of visitors' open-ended responses to the question, "In your own words, what do you think the museum was trying to show with this [component]?"

All of the comments are organized by which PEDT outcome they are in reference to, including:

- Planet Earth Decision Theater
- Science On a Sphere Films
- Multi-Touch Table
- Magic Planet

### Planet Earth Decision Theater Main Messages Emergent Coding

***"In your own words, what do you think the museum was trying to show with Planet Earth Decision Theater (n=97\*)"***

\*Some visitors' responses are coded into more than one theme, so percentages may exceed 100. Comments that are double-coded are followed by an asterisk.

#### *47% (46) Human Impact*

- What has and maybe will happen of the impact of people on Earth.
- Trends in human interaction and environment.
- To show everyone about the Earth and how we impact the world.
- The rapid changes in Earth since heavy industry.
- The PEDT was trying to show the Human-Environment interaction in the world/earth and the impact of these interactions.
- The impact of humans on the planet.
- The Human impact on our environment for Earth.
- That science demonstrates the immense negative impact of humankind on Earth/the environment.
- That our planet is changing and that humans are likely the biggest factor in that change.
- People's impact on the planet.
- Our impact on the planet.
- Our impact as human beings in the changes of the environment.
- Impact of people on the planet.
- Human impacts on earth.
- Human impact, you should have included the Pacific garbage patch.
- Human impact on our planet earth.
- Human impact on Earth. [2]
- Human activity has an effect on the earth.
- How we affect the earth.
- How people are changing our world.
- How people are affecting planet earth.
- How humans impact the planet.
- How humans have truly impacted the changes the earth has and will evolve.
- How humans have impacted the planet.
- How humans change the Earth.
- Global warming. Environment deterioration.
- Explain how humans affect the earth.
- Be aware of our impact.

- The impact of humans and human activity on earth.
- That as our world has shrunk in terms of connectivity we have increasingly burdened our planet with our activities.
- Show how innovative we are and the rate at which creativity accelerates. Also the affect of changes in human behavior on the planet.
- The link between earth changes and human activity.\*
- The effects of humans on the earth and environment.\*
- Climate change, human impact.\*
- We have changed our planet; must be a part of that change if we are to survive.\*
- The impact the humans have/are/and will cause on the planet.\*
- The impact of humans on the planet - need to do better. :(\*
- The impact of humans on Earth (land, sea, and air). The ability of humans to be inventive and put their genius to solving our global issues.\*
- The impact, responsibilities and possibilities of being human yesterday, today, and tomorrow.\*
- That we can make a change for both good and bad.\*
- It showed that the large number of people has and will have a large impact on the earth and that we should work to handle it. \*
- Humans impact the planet and can make changes to improve conditions.\*
- Humans have a big impact on the earth and at the rate we are going as a group, our earth is in high danger.\*
- How we need to be aware of how humans are impacting the earth in a negative way and how we can help.\*
- Earth is changing by people and we can change what we do.\*
- That as our world has shrunk in terms of connectivity we have increasingly burdened our planet with our activities.\*

### *21% (20) Need for Action*

- We can do a lot to care for our earth.
- We are all responsible for our Earth and our own health and life.
- That we as humans can do a lot to change the world for the better.
- That everyone needs to think about how to make the future better.
- That all humans have something to do with where the earth is going.
- People can make a difference.
- How we can change to make our planet healthier.
- We have changed our planet; must be a part of that change if we are to survive.\*
- The impact the humans have/are/and will cause on the planet.\*
- The impact of humans on the planet - need to do better. :(\*
- The impact of humans on Earth (land, sea, and air). The ability of humans to be inventive and put their genius to solving our global issues.\*
- The impact, responsibilities and possibilities of being human yesterday, today, and tomorrow.\*
- That we can make a change for both good and bad.\*
- It showed that the large number of people has and will have a large impact on the earth and that we should work to handle it. \*
- Humans impact the planet and can make changes to improve conditions.\*
- Humans have a big impact on the earth and at the rate we are going as a group, our earth is in high danger.\*

- How we need to be aware of how humans are impacting the earth in a negative way and how we can help.\*
- Earth is changes by people and we can change what we do.\*

#### *12% (12) Impact of Global Warming*

- Trying to champion for global warming.
- The changes in connections in the world and changes in climate.
- Show the effects of global warming.
- I think the point was to encourage and reinforce the facts of climate change, which I think is awesome.
- Effect of carbon dioxide emissions.
- The link between earth changes and human activity.\*
- The effects of humans on the earth and environment.\*
- Climate change, human impact.\*

#### *16% (16) Other*

- We have one earth and we need to take care of it.
- Very educational. He was a great speaker.
- Very educational.
- Trying to illustrate that the earth is fragile.
- There is hope!
- The problems society is encountering today.
- The importance of conservation.
- Sparks an interest in the world and global impacts.
- Show.
- Respecting our planet.
- Love the spinning globe.
- Informative.
- I believe the science museum works to educate adults and children alike in an effort to open the eyes of humans and to strike an interest in science (and in this case, specifically the earth). I don't think enough people recognize what's happening to our planet - this presentation helps in getting peoples' attention.
- How the south's atmosphere is changing.
- A quiz thing.
- That as our world has shrunk in terms of connectivity we have increasingly burdened our planet with our activities.\*

### **Science on a Sphere Main Messages Emergent Coding**

#### ***“In your own words, what do you think the museum was trying to show with this film?” (n=110\*)***

\*Some visitors' responses are coded into more than one theme, so percentages may exceed 100. Comments that are double-coded are followed by an asterisk.

#### *25% (28) Human Impact*

- Attempting to educate people as to the impact humans are having on the environment.
- Be green and eco-friendly. Human impact on the earth.\*

- Be more thoughtful of our actions and their impact on the earth. Be green. Fewer children per family.\*
- Effects of man on planet.
- Environmental impact of humanity on the earth. Good range of information presented and understood by myself and 7 year old daughter. The overall impact was "Be careful" as how we live our lives and our choices.
- Global warming - climate change brought on by human race.\*
- Global warming - how humans affect the earth.\*
- How fragile the earth is and how we are the biggest cause of the changes that are happening.
- How human activities are affecting the planet and what we are doing to learn more.
- How human activity affects the climate and our environment.\*
- How humans are changing the Earth.
- How humans are destroying the planet.
- How humans are impacting the temperature changes in the worlds oceans and the impact of these changes.\*
- How humans have impacted the ocean life.\*
- How oceans play a huge impact on our earth and how humans are affecting it.\*
- How people are changing the planet. All of the negative effects of pollution and such.
- How we affect the world and how the world affects us.
- How we as humans affect the oceans with all the CO<sub>2</sub> we put into the environment\*
- Human action does impact climate and we can adapt to better care for the earth and sustain human life.\*
- Human impact on our environment.
- Impact of humans on planet.
- Increasing [environmental] impact in face of exploding population.
- Influence of human activity on oceans.\*
- Inform us about how to prevent global warming efforts and how we are affecting the earth.\*
- Promoting human change or habit changes that [are] necessary for sustainability of life.\*
- Science and how natural resources are affected by a growing population.
- Show us how we affect the environment.
- That humans are wrecking the planet. Scientists are finding out how.
- That humans have a significant impact on the earth.
- That people need to stop polluting the earth and that we have had a big impact on the world and we need to protect it from the chemicals and destruction we have caused to it.\*
- The affects that we as humans have an affect on the Earth and its environment.
- The challenges and consequences that face our society if we continue along our current path of reckless over consumption or limited resources.
- The changes we are causing to our planet.
- The films were informing and advertising the global issues we have created and [are] currently experiencing.
- The impact human activity has on the global environment and how we have the power to positively influence these changes.
- The impact humans are having on the Earth's climate.\*
- The impact humans have on geography and how we change our environment.
- The impact humans have on the earth (oceans, air, land, etc.).

- The impact of human life on the earth.
- The impact of humans on the atmosphere.
- The impact of humans on the earth.

#### *24% (26) Impact of Climate Change*

- Awareness. The devastating affect of global warming.
- Be green and eco-friendly. Human impact on the earth.\*
- Climate change is happening and we are wary on ways to adapt.
- Climate change.
- Educate people on the effects of CO2.\*
- Educate visitors about global warming.
- Explain the basics of climate change.
- Global warming - climate change brought on by human race.\*
- Global warming - how humans affect the earth.\*
- How human activity affects the climate and our environment.\*
- How we use water.
- Human action does impact climate and we can adapt to better care for the earth and sustain human life.\*
- I enjoyed it. The museum was trying to educate us on changing climates and how earth is evolving.
- Impact of human activities on Earth and what the future fight hold. Especially like the idea of examining of how heat from cities may contribute to global warming. Nice connect of local research with global effort to understand earth's climate.
- In the human era film, the museum was trying to show how and can humans adapt with the different variables of the 'Earth's' change, whether it was climate, land or other changes.\*
- Inform us about how to prevent global warming efforts and how we are affecting the earth.\*
- Show how the earth's temperature is increasing.
- That climate change affects our food supply.
- That the air and atmosphere is becoming warmer increasingly.
- That we should be more aware of what goes in the ocean. CO2 also is very crucial to the amount of acidity.\*
- The effect climate change may have on our crops and ability to feed our growing world population.
- The effect of climate change.
- The effects of climate change - showing maps of Earth's increasing temps and talking about urban heat.
- The impact humans are having on the Earth's climate.\*
- The impact of climate change on animal and human futures and how scientists are conducting [studies] to quantify those effects.
- The importance of acknowledging that climate change is here and now. It exists and we need to address it.\*

#### *20% (22) Need for Action*

- Be more thoughtful of our actions and their impact on the earth. Be green. Fewer children per family.\*

- Conservation.
- Having a sense that it is important to protect the earth.
- How earth has evolved and how we need to take care of it.\*
- How feeding the growing population of the world may pose a problem for society, and efficiency with crop growing might help solve the problem.\*
- How important it is to ensure our water usage and agricultural growth is monitored to ensure the best and most environmentally safe methods are used.
- How the world is changing and that we need to act now to make changes to promote longevity of earth's resources and our home.\*
- Human action does impact climate and we can adapt to better care for the earth and sustain human life.\*
- In the human era film, the museum was trying to show how and can humans adapt with the different variables of the 'Earth's' change, whether it was climate, land or other changes.\*
- Inform the public on what is happening and how to deal [with] it!
- Less water waste, importance of preservation of water.\*
- Promoting human change or habit changes that [are] necessary for sustainability of life.\*
- Protect the earth, we are constantly changing.\*
- Tell us that we better take care of our planet.
- That humans can find newer and better ways to use our food source.
- That people need to stop polluting the earth and that we have had a big impact on the world and we need to protect it from the chemicals and destruction we have caused to it.\*
- That we need to be more eco-friendly.
- The challenges and threats to our earth and the need to address them.
- The importance of acknowledging that climate change is here and now. It exists and we need to address it.\*
- We must change to protect the Earth.
- We need to protect the earth. We need to take [care] of our Earth.

#### *14% (15) Water and Oceans*

- Educate people on the effects of CO<sub>2</sub>.\*
- Effect of pollution and acid rain on the oceans over time.
- How feeding the growing population of the world may pose a problem for society, and efficiency with crop growing might help solve the problem.\*
- How humans are impacting the temperature changes in the worlds oceans and the impact of these changes.\*
- How humans have impacted the ocean life.\*
- How important water is to us.
- How oceans play a huge impact on our earth and how humans are affecting it.\*
- How we as humans affect the oceans with all the CO<sub>2</sub> we put into the environment\*
- How we need water and we really liked the alligator.
- Influence of human activity on oceans.\*
- Less water waste, importance of preservation of water.\*
- Oceans heating up.
- That we should be more aware of what goes in the ocean. CO<sub>2</sub> also is very crucial to the amount of acidity.\*
- The importance of water.

- The invisible yet serious problem of ocean acidification caused by CO<sub>2</sub>.

#### 5% (6) *Evolving Earth*

- Awareness of the rapid changes and [an] attempt at a positive message of action.
- Earth change.
- How earth has evolved and how we need to take care of it.\*
- How the Earth is changing.
- How the world is changing and that we need to act now to make changes to promote longevity of earth's resources and our home.\*
- Protect the earth, we are constantly changing.\*

### **Multi-Touch Table Main Messages Emergent Coding**

#### ***“In your own words, what do you think the museum was trying to show with the table?” (n=218)***

\*Some visitors' responses are coded into more than one theme, so percentages may exceed 100. Comments that are double-coded are followed by an asterisk.

#### 45% (98) *Sea Level Rise*

- An interactive but accessible and practical experience illustrating the real effects of sea level change.
- Climate change and the effects of rising sea levels/reaction[?] about the impact of climate change.\*
- Dangers of rising sea level.
- Dangers of sea level increase (especially in major storms) and results of global warming.\*
- Effect of global warming and environmental sea levels. Storm damage changes because of the rising levels.\*
- Effect of rising sea levels.
- Effect of water level, interacting with storm surge, and what new levels mean in more tangible terms (oysters/storm damage).\*
- Effects of high water levels.
- Effects of water height increase.
- For the public to understand the effects of sea level and possible land destruction based on changes with storms.\*
- How a change in sea level effects the economy.
- How changing water affects the world and prices.
- How climate change and rising sea levels can damage a coastal city.\*
- How downtown Baltimore would be affected by rising sea levels and storms.\*
- How rising sea levels can and potentially will impact coastal cities that are vulnerable, and what can be done to prevent this.\*
- How rising sea levels will affect coastal cities and everyday life.
- How rising sea levels will affect humans.
- How rising sea levels will impact flooding and what we can do to change/save lives.\*
- How rising seas combined with stronger storms will put millions of people in danger.\*
- How sea level is impacted by weather conditions and how building at edge of water could be determined under extreme conditions.\*
- How sea levels rise with storms.\*

- How storms and rising sea levels affect the Inner Harbor.\*
- How storms and sea level could impact the area.\*
- How storms can have a huge impact on the city.\*
- How storms, hurricanes, and levels of water can affect the rising inner harbor.\*
- How storms/water level increase can impact people and the harbor. \*
- How the earth is evolving and how it's raining more and more. So a lot of lakes are "no wake" and sea level's rising because of more rain, and the flooding damage it might create.
- How the rise of water would affect the situation of Inner Harbor water level.
- How water can rise and might threaten Baltimore.
- How water levels can have a drastic impact on shoreline and cities.
- How water levels from different severities of storms can affect our area.\*
- How we personally will be affected by rising sea level in Baltimore.
- How we should or what we should do to preserve land and keep sea levels contained in their area.\*
- I think that the table is trying to show the possible effects of storms and raising sea levels in the Baltimore area. It was interesting to view.\*
- I think the museum is trying to show how damaging rising tide can be along with natural weather.
- I think the museum is trying to show that even a small (or what seems like small) amount of water can have incredible lasting affects.
- I think the museum was attempting to offer instantaneous comparisons of various water level increases that will occur as the earth warms again. \*
- I think the museum was trying to show how rising sea levels will affect low-lying major cities such as Baltimore/Inner Harbor area.
- Impact of rising water with climate change and the effect on civilization in cities.\*
- It is trying to make people interested and concerned about rising sea levels.
- It shows the potential for change based on not only rising sea levels, but storm impact on the rising sea levels. Both potential future problems to plan for now.\*
- Rising sea levels are a problem on their own, but coupled with storms (large or small) make the problem worse.\*
- Rising sea levels. Global warming effects.\*
- Rising water levels across Earth.
- Risk of flooding to Baltimore area.
- Sea level change as a result of climate change.\*
- Sea levels affect on flooding and its implication on human life stemming from climate change' impact on sea level.\*
- Sea levels and how over time the level will get higher and higher.
- Sea levels and storm surges in the future.\*
- Show effects of rising water level and potential damage.
- Showed rising sea levels and the effects varying strengths of storms and currents would have on the harbor, oysters, water (drinking) etc.\*
- That climate change will cause rising water levels, which will have real effects on humans.\*
- That if sea levels rise, coastal cities could be endangered.
- That with the rising water can flood Baltimore.
- The affects of rising sea levels and storms on populated areas.\*
- The consequences of not preparing for impending sea level rise.



- The dangerous rising currents of water.
- The dangers of raising sea levels and the importance of trying to reduce global warming.\*
- The dangers of rising sea levels.
- The effect of rise in water level to Baltimore.
- The effect of rising water and storms. How it causes economic and physical damage.\*
- The effect of rising water levels on the people in the region.
- The effects of a storm on the inner harbor and rising sea level.\*
- The effects of flood waters/large storms on port cities.\*
- The effects of flooding on a city in various degrees.
- The effects of global warming and sea level rising.\*
- The effects of rising and falling sea level on communities.
- The effects of rising sea levels in Baltimore due to hurricanes.\*
- The effects of rising sea levels on the Baltimore area and its impact when paired with existing weather patterns.\*
- The effects of rising water due to a variety of storms.\*
- The effects of rising water levels. But shows nothing of what could happen in MN, so not a lot of useful info.
- The effects of rising water/sea levels.
- The effects of sea level and storms on the city of Baltimore.\*
- The effects of storm surges/water rising on the inner harbor and its surroundings.\*
- The effects of storms and rising water levels on the Inner Harbor. I liked the suggestions on how to prevent the damage.\*
- The effects of water level in the sea on places we wouldn't think would be affected.
- The effects on the city and people of rising tides.
- The future dangers of known events exacerbated by an increase in sea level.\*
- The harbor water level can rise from storm surges. I put the pieces together that this is made worse by the sea level being higher from climate change, but I think this is a little obscured by the interface.\*
- The impact of global warming and rising sea levels.\*
- The museum was trying to show how rising sea levels can affect the infrastructure of the city, as well as the ecosystem. When coupled with a storm surge it can cause more damage.\*
- The negative impact that rising sea level has on cities such as Baltimore and other low-lying effects. Depending on Severity of storm, the effects could be devastating.\*
- The result of rising sea levels and its effects on infrastructure in coastal areas in relation to storm size and surge.\*
- The rise of water levels after different storms.
- The rising sea levels.
- The sea level and storms can affect many different environments in many different ways. Some good, and some bad.
- The storms and rising water levels may affect Baltimore's shores and harbor and what might be done to help.\*
- The table shows the area around the Inner Harbor that would be covered by water, assuming up to a three foot rise in sea levels, both during large and small storms and on a regular basis (fair weather). These two types of condition changes can be combined.\*
- The vulnerability of low lying cities and the change in sea levels that may come in the future.
- To show that if sea levels keep rising, harbors, land can disappear.

- Trying to show the negative effects of rising sea levels. I would like a list of possible causes for this phenomenon, such as global warming melting polar ice.
- Water flooding and the weather.\*
- What can happen if the water rises in the harbor.
- What could happen during storms with high sea level.\*
- What the effects are of the water levels rising. Also what the dangers are.
- What will happen in the future with rising oceans.
- When the water level rises it can devastate the inner city.
- With increasing sea level, damage to Baltimore, for instance, is also increased.

### *31% (67) Storm Danger*

- Damage occurs with storms to the shorelines, flooding occurs with the level of hurricane.
- Effect of global warming and environmental sea levels. Storm damage changes because of the rising levels.\*
- Effect of water level, interacting with storm surge, and what new levels mean in more tangible terms (oysters/storm damage).\*
- Effects of storm surge in populated areas nearby.
- Effects of storm water on the city.
- Effects of storms on coastal areas.
- Effects of storms on modern water municipalities. Ex: Hurricane Isabel.
- Effects of storms.
- Flood impact of storm surges.
- For the public to understand the effects of sea level and possible land destruction based on changes with storms.\*
- Future outcomes of storms in coast line cities and ways to look forward to help prevent damage.\*
- Global warming impact? Or natural disaster predictions.\*
- How a storm affects the harbor.
- How a storm could really devastate some of our most popular areas in Baltimore.
- How currents rising and the possibilities of storms could cause the Inner Harbor to be underwater by 2100.
- How damaging flooding could be with larger storms.
- How downtown Baltimore would be affected by rising sea levels and storms.\*
- How rising seas combined with stronger storms will put millions of people in danger.\*
- How sea level is impacted by weather conditions and how building at edge of water could be determined under extreme conditions.\*
- How storms affect the waterfront.
- How storms and rising sea levels affect the Inner Harbor.\*
- How storms and sea level could impact the area.\*
- How storms can be caused and what happens.\*
- How storms can have a huge impact on the city.\*
- How storms tides affect the Baltimore area.
- How storms would affect/damage Baltimore area.
- How storms, hurricanes, and levels of water can affect the rising inner harbor.\*
- How storms/water level increase can impact people and the harbor. \*
- How the weather affects life.\*

- How vulnerable our Inner Harbor is. How even a small storm can affect our infrastructure.
- How water levels from different severities of storms can affect our area.\*
- I think that the table is trying to show the possible effects of storms and raising sea levels in the Baltimore area. It was interesting to view.\*
- It shows the potential for change based on not only rising sea levels, but storm impact on the rising sea levels. Both potential future problems to plan for now.\*
- One effect of global warming on a sea coast city. The effect of storms on a coastal city.\*
- Rising sea levels are a problem on their own, but coupled with storms (large or small) make the problem worse.\*
- Sea levels and storm surges in the future.\*
- Showed rising sea levels and the effects varying strengths of storms and currents would have on the harbor, oysters, water (drinking) etc.\*
- Something that will make people aware that storms have a massive effect on the environment.
- Storm damage or environmental impact with floods.
- Storm damage possibilities.
- That the sea level around the harbor is rising and depending on how severe a storm is. It may destroy downtown.
- The affects of rising sea levels and storms on populated areas.\*
- The effect of rising water and storms. How it causes economic and physical damage.\*
- The effects of a storm on the inner harbor and rising sea level.\*
- The effects of flood waters/large storms on port cities.\*
- The effects of rising sea levels in Baltimore due to hurricanes.\*
- The effects of rising sea levels on the Baltimore area and its impact when paired with existing weather patterns.\*
- The effects of rising sea levels related to climate change.\*
- The effects of rising water due to a variety of storms.\*
- The effects of sea level and storms on the city of Baltimore.\*
- The effects of storm surges/water rising on the inner harbor and its surroundings.\*
- The effects of storms and rising water levels on the Inner Harbor. I liked the suggestions on how to prevent the damage.\*
- The harbor water level can rise from storm surges. I put the pieces together that this is made worse by the sea level being higher from climate change, but I think this is a little obscured by the interface. \*
- The interactiveness of a storm and how it would affect the Inner Harbor area by being in the track of a storm.
- The museum was trying to show how rising sea levels can affect the infrastructure of the city, as well as the ecosystem. When coupled with a storm surge it can cause more damage. \*
- The negative impact that rising sea level has on cities such as Baltimore and other low-lying effects. Depending on Severity of storm, the effects could be devastating. \*
- The result of rising sea levels and its effects on infrastructure in coastal areas in relation to storm size and surge.\*
- The storms and rising water levels may affect Baltimore's shores and harbor and what might be done to help.\*

- The table shows the area around the Inner Harbor that would be covered by water, assuming up to a three foot rise in sea levels, both during large and small storms and on a regular basis (fair weather). These two types of condition changes can be combined.\*
- They were trying to show that storms can have a huge effect on lands and buildings, causing the loss of land and buildings.
- Water flooding and the weather.\*
- What a big storm could do to a city, and a predictor of what could happen.
- What could happen during storms with high sea level.\*
- What could happen if a big storm hit and the disaster it could cause.
- What happens with different storms, a small hurricane vs. a large hurricane.
- What weather and hurricanes can do to the coastline.
- What would happen to the Inner Harbor if a storm hit.

### *15% (33) Impact of Climate Change*

- Climate change and the effects of rising sea levels/ reaction[?] about the impact of climate change.\*
- Climate change has potential impact on a large number of people in the United States.
- Climate change is no joke. We need to stop or at least slow down global warming! Future development must take the estimated water levels before building new buildings, roadways, etc.
- Climate Change.
- Dangers of sea level increase (especially in major storms) and results of global warming.\*
- Effect of global warming and environmental sea levels. Storm damage changes because of the rising levels.\*
- Effect of global warming or "Climate Change".
- Effects of global warming on shore lines and current cities on coastal areas.
- Effects of global warming.
- Global warming impact? Or natural disaster predictions.\*
- Global warming's effects.
- How climate change and rising sea levels can damage a coastal city.\*
- How devastating climate change is. Personalized it--we can see how it affects our own home area. Get us thinking about how we need to make changes now to avoid this.\*
- How sea levels rise with storms.\*
- How storms affect the Inner Harbor.
- How storms could effect the harbor and surrounding areas.
- I think the museum was attempting to offer instantaneous comparisons of various water level increases that will occur as the earth warms again.\*
- Impact of rising water with climate change and the effect on civilization in cities.\*
- One effect of global warming on a sea coast city. The effect of storms on a costal city.\*
- Raise awareness on global warming and how it can impact us.
- Rising sea levels. Global warming effects.\*
- Sea level change as a result of climate change.\*
- Sea levels affect on flooding and its implication on human life stemming from climate change' impact on sea level.\*
- That climate change will cause rising water levels, which will have real effects on humans.\*
- The danger that can be caused by storm surges.

- The dangers of raising sea levels and the importance of trying to reduce global warming.\*
- The effects of global warming and sea level rising.\*
- The effects of global warming.
- The effects of rising sea levels related to climate change.\*
- The harbor water level can rise from storm surges. I put the pieces together that this is made worse by the sea level being higher from climate change, but I think this is a little obscured by the interface.\*
- The impact of global warming and rising sea levels.\*
- The influence climate change would have on a highly populated coastal city.
- The museum was trying to show how much the climate has to do with changing the environment and land structure - thereby having a significant impact on the ecological system. It was nice to see suggestions on ways to help decrease the impact.\*

#### *7% (15) Need for Action*

- Earth changes. How the Earth changes. Future City planning needs.
- Future outcomes of storms in coast line cities and ways to look forward to help prevent damage.\*
- How devastating climate change is. Personalized it--we can see how it affects our own home area. Get us thinking about how we need to make changes now to avoid this.\*
- How rising sea levels can and potentially will impact coastal cities that are vulnerable, and what can be done to prevent this.\*
- How rising sea levels will impact flooding and what we can do to change/save lives.\*
- How to plan now to protect the future. What happened historically.
- How we should or what we should do to preserve land and keep sea levels contained in their area.\*
- It shows the potential for change based on not only rising sea levels, but storm impact on the rising sea levels. Both potential future problems to plan for now.\*
- Our impact on our environment, how we can better anticipate floods and be prepared.\*
- Potential awareness of contaminated water planning ahead.
- Scary! Need to take action!
- The effects of storms and rising water levels on the Inner Harbor. I liked the suggestions on how to prevent the damage.\*
- The museum was trying to show how much the climate has to do with changing the environment and land structure - thereby having a significant impact on the ecological system. It was nice to see suggestions on ways to help decrease the impact.\*
- The risks and danger of the future. Perhaps a warning to take action.
- The storms and rising water levels may affect Baltimore's shores and harbor and what might be done to help.\*

#### *2% (5) Other*

- Amazing how much damage can be done. Scary.
- How amazing but deadly nature can be.
- I think it was trying to show how much earth can effect our life.
- I think this museum was trying to show the affects and damage on the environment and city.
- The impacts that we'll probably have with the ice melting.

## Magic Planet Main Messages Emergent Coding

### ***“In your own words, what do you think the museum was trying to show with the Magic Planet?” (n=157\*)***

\*Some visitors' responses are coded into more than one theme, so percentages may exceed 100. Comments that are double-coded are followed by an asterisk.

#### *45% (71) Human Impact*

- A more tangible experience to portray how the human condition affects the world.
- Connectivity, the effect the masses have on the earth on a global scale.\*
- Differences by region in terms of impact of human activity on the planet.\*
- Effects humans are making on the planet.
- Give greater awareness of relationships between humans and our planets.
- Global effect of variables.
- Globalization, and cultural/technological differences, the impact that humanity has on the planet.
- How earth (or planets in general) would work with human life controlling and doing things on planets.
- How earth is impacted by our actions - how everyone's actions, everywhere, affect us all.
- How globally impactful our human interactions can be on resources and the allocation of finite resources - also, how inter-connected we have become through technological /information influences and developments industrially and personally.\*
- How human activity affects the earth and water that surrounds us.
- How humans are changing the world.
- How humans impact and interact with the world.
- How humans impact different areas of the globe.
- How humans impact the earth and how the environment is affected. It makes you aware of your contribution to the earth and all the ecosystems.
- How humans impact the Earth.
- How humans impact the globe and how social media is taking over.
- How much humans impact the planet.
- How our infrastructure affects the earth.
- How our planet is affected by different changes in weather or other earthly changes. How we should interact with and protect the environment.
- How our world is affected by different aspects of society.
- How the effects of humans change the world around us.
- How the humans effect and interact with the earth.
- How we are all connected and to what extent and how this affects our planet.\*
- How we humans affect the planet.
- Human impact and influence on the Earth.
- Human impact on our planet.
- Human impact on planet. How humans have impacted/transformed the earth.
- Human impact on the earth.
- Human impact on the Earth.
- Human impact on the earth. And the impact of social media.
- Human impact to the earth.
- Human impact, global connection.\*
- Human impacts on the earth.

- Human populations and their impact on the planet.
- Humans impacts on earth.
- I believe that it was trying to show much the Earth has been/is affected by human activity.
- I believe the museum was trying to show real time results and fractions of the earth that are covered with various human activities. I think it emphasizes the impact we can have on the planet.
- Impact of different things to our earth.
- Impact of human activity on planet earth.
- Impact of humans on earth.
- Impact of humans on the planet.
- Impact of humans on the world.
- Industrialism and how it affects our earth.
- Interaction with humans and earth.
- International connections of various environmental and technological impacts across the globe.\*
- It shows actual involvement of humans in the world, as well as the ensuing results. Its also helps identify areas of growth - railroads, air traffic, crops, livestock, people networking, oceans and how we are a part of that in this great big world. Super great idea to demonstrate a broad overview.
- Museum trying to show how we humans our changing our Blue Planet and should take responsibility to protect it in future.
- Our impact on earth. The connectivity of human relationships all over the world.\*
- Our impact on our planet.
- Our impact on the planet.
- That the earth's resources are limited, and that we are all connected to each other and have an impact. That different regions have different conditions/resources/possibilities.\*
- The affect of different things all over the planet that not many people can put into perspective.
- The affect on the Earth by the human population.
- The effect humans have on changing the planet.
- The effects of humans on the planet.
- The effects of pollution. The regions of the world that supply crops and animals. The power of social media.\*
- The human impact for our living earth.
- The impact of human activity in a global scale.
- The impact of humans on our planet.
- The impact of people & technology on our natural world.
- The increasing impact humans have on Earth.
- The Magic Planet showed the density of pastureland, farmland, rail lines, air travel, and Facebook connections across the globe. Overall, it describes the impact of humans on the planet.
- The museum is showing the human relation with the Earth. Mostly, it shows our lives and our effects on the planet.
- The museum was trying to make an impression on us about the impact we have on our planet.
- The strong effect humans have on the world; mostly negative effects.

- The way people have impacted the planet, how we use our planet as we travel, populate and live our daily lives.\*
- To show humans impact on our planet.
- Us spreading and populating and affecting the earth.
- What humans have done to earth and our impact on the planet.
- Where people and animals are impacting earth.

### *28% (44) Data Visualization*

- A global view of important information, so we are focused on just America.
- A look into the looks in different perspectives.
- Awareness of our planet, atmosphere energy usage.
- Changes that are happening to our planet\*
- Connectivity, the effect the masses have on the earth on a global scale.\*
- Density of different topics.
- Differences by region in terms of impact of human activity on the planet.\*
- Different areas of the earth and what the traffic patterns are for relevant topics - of communication, travel, and population.
- Different areas of the world and plants.
- Different facts about the world.
- Display the different time zones.
- Either how connected the world is or to show where certain things are concentrated.\*
- How countries are the same in ways and different in others.
- How far certain things are spread across the whole world.
- How humans are using the earth.
- How many areas of this planet that we've (humans) by building our paths and cities.
- How the earth looks in different ways.
- How the earth looks in each network and how different the networks compare.
- How the earth operates, what kind of activities that go on.
- How the entire world is utilized on a day-to-day basis.
- How we live, our population and how we keep our environment.
- I believe that the museum was trying to portray how humans are connected around the world and different viewpoints of the Earth.\*
- Images of earth given specific conditions.
- Information about different aspects the world have in general.
- Information about Earth.
- International connections of various environmental and technological impacts across the globe.\*
- It seems to do with population and transportation/communication forms available to them.
- Many interesting things about our planet.
- Our impact on earth. The connectivity of human relationships all over the world.\*
- Patterns of population density - rail, air, cropland, etc.
- Population density and distribution of technology.
- Show how much power we use.
- Statistics in a visual presentation.
- That the earth's resources are limited, and that we are all connected to each other and have an impact. That different regions have different conditions/resources/possibilities.\*



- The current state of the Planet as illustrated with technology utilization.
- The effects of pollution. The regions of the world that supply crops and animals. The power of social media.\*
- The evolution of human expansion and what we have accomplished over time.
- The relation of population in proportion to the earth.
- The way people have impacted the planet, how we use our planet as we travel, populate and live our daily lives.\*
- Trends around the world in a simple, engaging format.
- Variances of our planet.
- What goes on around the world, when it happens, and why.
- What parts of the planet are being used for different things.
- Your choices of what you wanted to see on the planet.

#### *11% (18) Global Connectedness*

- Connectivity of the world.
- Demonstrating global connections through many avenues - agriculturally, technologically, and through physical networks.
- Either how connected the world is or to show where certain things are concentrated.\*
- Global connections.
- How globally impactful our human interactions can be on resources and the allocation of finite resources - also, how inter-connected we have become through technological /information influences and developments industrially and personally.\*
- How interconnected the world is.
- How the world is connected and the similarities in resources there are.
- How the world is interconnected.
- How thin the world is getting.\*
- How we are all connected and to what extent and how this affects our planet.\*
- Human impact, global connection.\*
- I believe that the museum was trying to portray how humans are connected around the world and different viewpoints of the Earth.\*
- I think it was trying to show how interconnected we are as a planet.
- Interconnectivity of humans and our planet.
- Is trying to show you in a interesting way how our world is connected.
- Showing how people have inhabited the world and how we connect.
- The connections humans make across the planet.
- The way we all connect on Planet earth...Trick question. I don't know?

#### *8% (12) Global Comparison*

- Change perceptions of globalization, increase thinking about geographic similarities/dissimilarities.
- Different areas in the world and how they compare to other areas of the world.
- Different countries' interactions and how it affects different things in our world (farming, jobs, networking).
- How different places and cultures use technology vs. food production (transportation).
- How diverse the world is, but still connected by air traffic and Facebook friends for example.
- I think they were trying to compare and relate technology between areas and countries.

- The differences in developed and developing nations. A space-eye view of our planet.
- The earth's diversity technologically, geographically and [illegible] part politically (# of Facebook users) - very interesting! Only complaint it was a little buggy but whatever it's new.
- The Magic Planet shows how interconnected the earth is. The globe also shows the differences between industrialized and developing nations.
- The museum is trying to get people to be aware of how much usage of certain things are being used around the world. Trying to get people to see the difference in the big picture. I expected a bigger surprise in what was going to happen, but all I could do was scroll and read. Although it is interesting to know how much Facebook is being used and where.
- Where cities and large populations are located, differences in technology between developed and undeveloped countries.
- Yes, because it is fascinating to see how each country compares to one another (like the night and Facebook views).

*8% (12) Other*

- A better global understanding of the things we take for granted; perspective on how these things occur (I was most surprised by the cropland segment - I thought I would see a lot more green.)
- A global modernization.
- How we live in a global world and that everything from Facebook to Crops is affected worldwide.
- I believe the museum was trying to show how far human technology, travel, and agriculture have gone (or changed).
- I speak English very badly, sorry!
- It's awesome! We like the way you did it.
- Thank you for the opportunity to use the exhibit. My children found it very interesting; It changes the way they look at some things.
- That things change.
- The globe is infinitely larger than our own myopic and provincial view of the US.
- The importance of sustenance vs. technology in areas of the world.
- The largeness of the world and what effects humans have on global systems.
- The outlook on different aspects of the world.