Needs Assessment for Potential Host Institutions of
NASA Landsat Data Continuity Mission (LDCM) Exhibit

Prepared for
Sigma Space and NASA EPO Team

OMSI
Everyday Encounters with Science

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Executive Summary

Overview

This report describes a needs assessment study conducted to guide development of a traveling exhibit subcontracted for construction to the Oregon Museum of Science and Industry (OMSI), located in Portland, Oregon. The subject of this exhibit, the NASA Landsat Data Continuity Mission (LDCM), is the most recent in a series of eight satellites constructed and launched by NASA to monitor the surface of the Earth, with the goal of providing data which may be used to address and solve geological, environmental, and social challenges. In order to increase public awareness and knowledge, the NASA Education and Public Outreach (EPO) Team subcontracted with OMSI to develop an exhibit intended for display in NASA's Goddard Space Flight Center other small science centers and other institutions across the country. OMSI evaluators conducted a survey of administrators and staff members at potential hosting institutions to assess potential needs which might inform exhibit development. (It should be noted at the outset that the terms "LDCM" and "LANDSAT" are used interchangeably throughout the body of this document.)

Methods

Potential hosting institutions were chosen in alignment with NASA EPO criteria (i.e., small- to medium-sized museums, science centers, libraries, and science programs). A total of 83 individuals participated in the survey, representing between 77 and 79 unique institutions. These institutions were drawn from contact lists provided by NASA EPO team members, OMSI interdepartmental contacts, and the Association of Science-Technology Centers (ASTC) Membership Services. In addition to the primary sample, the survey was distributed to a secondary sample consisting of American Library Association member libraries. In sum, the survey was distributed to a sampling frame of approximately 300 institutions, with a response rate of ~27.7%. Participant incentive consisted of an invitation to a drawing for free delivery of the proposed exhibit to one participating institution.

Evaluators employed a self-administered online survey questionnaire, including an Informed Consent statement which required acknowledgement and acceptance by participants prior to initiation of the questionnaire proper. An online link to the survey instrument was distributed via e-mail to study participants on Friday, September 28, 2012; the survey remained open until Monday, October 8, 2012.

Quantitative data collected in this study were analyzed through the use of IBM SPSS Version 18, focusing upon descriptive statistics, primarily frequencies, to assess participant distribution across response categories. Evaluation of open-ended data was conducted through identification of persistent themes across participant responses. Regardless of method, multiple evaluators assessed the results of each analysis to ensure consistency and accuracy.

Summary of Findings

- In addition to questions regarding cost, size, and educational value, "audience relevance" was a theme which arose with relative frequency during evaluation of priorities, interest, and potential concerns.

- Among all categories of possible content, there were two which appeared least relevant to survey participants: "How long LANDSAT technology has been in use" and "LANDSAT technology and society."

- Based on the data collected here, it appears that the visitors most likely to make use of the exhibit are those in the elementary to middle school age range, making this group the target audience for this exhibit.

- Given the potential target audience, the language used in the exhibit should remain at a level appropriate for grades 4–6. Additionally, the physical structure of the exhibit (e.g., height, ease of interaction) should be designed to accommodate young audience members.

- Common recommendations regarding what might be done to facilitate integration of the LANDSAT exhibit into existing floor plans included modularity to allow drawing attention to the exhibit visually in a public space.

- Over 75% of needs assessment participants stated that their institution could afford $500 or less in delivery costs for the exhibit; however, museums and science centers were significantly more likely to report greater amounts available to allocate for delivery than were libraries.

- Having said this, it is also worth noting that the lack of availability or opportunity was the single most frequently stated reason for institutions having never hosted exhibits such as the NASA LANDSAT exhibit. Additionally, the data collected here indicate that audience members at potential host institutions overwhelmingly find space- and satellite-related exhibits to be moderately to very enjoyable.

- Museums and science centers requested significantly longer lending periods for the exhibit than did libraries; the vast majority of libraries requested lending periods of no more than three months. These data can provide support for a seasonal or regional distribution approach if needed; additionally, they suggest that some library systems may have the capability to tour the exhibit within their constituent branches by themselves.

- Multiple survey participants voiced concerns regarding the placement of the exhibit in high-traffic common areas, particularly in public libraries.

- Numerous participants mentioned they have visited OMSI in the past and have enjoyed partnering with this institution; it may be advisable to consider them as peer reviewers when prototype audience testing is being conducted.

Overview

The survey described below constituted the primary component of a needs assessment study conducted to guide the development and production of a traveling NASA Landsat Data Continuity Mission (LDCM) exhibit subcontracted for construction to the Oregon Museum of Science and Industry (OMSI), located in Portland, Oregon. The LDCM is the most recent in a series of eight satellites constructed and launched by NASA to monitor and maintain a consistent visual record of the surface of the Earth, with the goal of providing data which may be used to address and solve geological, environmental, and social challenges. In order to increase public awareness and knowledge of the LDCM project, the NASA Education and Public Outreach (EPO) Team subcontracted with OMSI to develop an exhibit intended for initial display in NASA's Goddard Space Flight Center and subsequent hosting by small science centers and other institutions across the country. Prior to commencing fabrication of the exhibit, OMSI evaluators conducted a survey of administrators and staff members at potential hosting institutions to assess potential needs and concerns which might inform exhibit development and construction. (It should be noted at the outset that the terms "LDCM" and "LANDSAT" are used interchangeably throughout the body of this document.)

Objectives of Needs Assessment Study

1. Determine levels of interest in the proposed NASA LDCM exhibit across administrators and staff at potential hosting institutions.
2. Identify any specific reasons for institution noninterest in hosting the proposed NASA LDCM exhibit specifically or space- or satellite-related exhibits in general.
3. Identify any consistent requests by institution staff and administrators regarding specific properties of the proposed exhibit and specific requests regarding timeframe for hosting.
4. Identify existing exhibits at potential hosting institutions which pertain to space, satellites, or related topics, and assess whether the proposed LDCM exhibit would be incorporated into any such existing exhibits or would be used as a stand-alone display.
5. Identify institution audience demographics which are considered most likely to engage with and make use of the proposed exhibit.
6. Ascertain what, specifically, professional audience members feel visitors to their institutions would most like to see and experience in regards to the proposed exhibit.
7. Assess ability of potential host institutions to pay shipping charges associated with transport of the proposed exhibit.

Methods

Participants
Potential hosting institutions were chosen in alignment with NASA EPO criteria (i.e., small- to medium-sized museums, science centers, libraries, and science programs) and were recruited for inclusion in the needs assessment survey on September 28, 2012. A total of 83 individuals participated in the survey, representing between 77 and 79 unique institutions. The majority of institutions were represented by only one survey participant; however, two participants declined to provide their institutional affiliation making precise calculations impossible.

Sampling
The primary study sampling frame consisted of administrators and staff members active at small- to medium-sized informal science education (ISE) institutions within the United States. These institutions were drawn from contact lists provided by NASA EPO team members, OMSI interdepartmental contacts, and the Association of Science-Technology Centers (ASTC) Membership Services. In addition to the primary sampling frame, the survey was distributed to a secondary sampling frame consisting of American Library Association member libraries.

In sum, the survey was distributed to a sampling frame of approximately 300 institutions, with a response rate of ~27.7% ($N = 83$). Participant incentive consisted of an invitation to a drawing for free delivery of the proposed NASA LDCM exhibit to one participating institution, with participating institutions notified of drawing results on Wednesday, October 31, 2012.

Data Collection
Evaluators employed a self-administered online survey questionnaire with an estimated completion time of 15 minutes, including an informed consent statement which required acknowledgement and acceptance by participants prior to initiation of the questionnaire proper. The full survey instrument is attached to this document as Appendix A.

An online link to the survey instrument was distributed via e-mail to study participants on Friday, September 28, 2012; the survey remained open until Monday, October 8, 2012, at which time data collection closed and submissions were analyzed.

Data Analysis
Quantitative data collected in this study were analyzed through the use of IBM SPSS Version 18, focusing upon descriptive statistics, primarily frequencies, to assess participant distribution across response categories. Evaluation of open-ended data was conducted through identification of persistent themes across participant responses (Patton, 2002; Shaw, 1999), with specific responses selected as being representative of such themes; these responses have not been edited in any way and are presented as direct quotations exactly as stated by respondents. Regardless of method, multiple evaluators assessed the results of each analysis to ensure consistency and accuracy (King, Keohane, & Verba, 1994).

Findings

Institution and Visitor Demographics

Of the 83 individuals who participated in the survey, 56.6% ($N = 47$) reported as being affiliated with libraries, 18.1% ($N = 15$) reported affiliation with science centers, 15.7% ($N = 13$) reported affiliation with museums, 2.4% ($N = 2$) declined to state their institutional affiliation, and 7.2% ($N = 6$) reported affiliation with another type of institution. Other institution types reported by participants included a *"Merged Museum AND Science Center,"* a *"High School with Library and Museum fully open and accessible to the public,"* and a *"Visitor Center,"* among others. Participants were also asked to provide basic demographic information regarding their institution's visitors; as illustrated in Table 1, by far the most common group compositions reported were families (86.4%, $N = 70$) and student groups (82.7%, $N = 67$). Representative elaborative responses by participants who selected "Other" included *"School Tours," "We are a new museum, and don't have stats yet,"* and *"We're a public library; lots of people come alone, lots with friends/family members."*

Table 1: Most Common Group Composition of Visitors to Institution

	# of respondents	% of respondents (total $N = 81$)
Family	70	86.4%
Students	67	82.7%
Out-of-town visitors	29	35.8%
Alone	25	30.9%
Friends	21	25.9%
Co-workers	7	8.6%
Other	7	8.6%

*Participants selected all that applied; as a result, percentages do not add to 100

Survey participants were also asked to state the most common ages of visitors to their institution, as well as the visitor age range which they felt would be most likely to use the LDCM exhibit; responses to these questions are illustrated in Tables 2 and 3 respectively. Unlike visitor group composition, reported ages of visitors were relatively evenly distributed, with elementary school students (ages 6–12) and adults (ages 36–55) being the most common. Similarly, participant assessments of the visitor age range most likely to make use of the LDCM exhibit were distributed relatively evenly across middle school students (ages 13–15), elementary school students (ages 6–12), and adults (ages 36–55). These findings indicate that while grade school students should likely be identified as the exhibit's target audience, the distribution of responses may suggest that the exhibit should be designed to appeal to a wide range of ages.

Table 2: Most Common Ages of Visitors to Institution

	# of respondents	% of respondents (total $N = 81$)
Elementary (6–12)	70	86.4%
Adults (36–55)	64	79%
Seniors (56+)	55	67.9%
Middle school (13–15)	52	64.2%
Toddlers (3–5)	50	61.7%
Young adults (19–35)	50	61.7%
High school (16–18)	41	50.6%
Infants (0–2)	34	42%
Not sure	0	0%

*Participants selected all that applied; as a result, percentages do not add to 100

Table 3: Age Ranges Considered Most Likely to Use LDCM Exhibit

	# of respondents	% of respondents (total $N = 81$)
Middle school (13–15)	59	72.8%
Elementary (6–12)	58	71.6%
Adults (36–55)	51	63%
High school (16–18)	44	54.3%
Young adults (19–35)	42	51.9%
Seniors (56+)	37	45.7%
Toddlers (3–5)	5	6.2%
Infants (0–2)	2	2.5%
Not sure	0	0%

*Participants selected all that applied; as a result, percentages do not add to 100

Institution Content and Planning
Subsequent to providing demographic information regarding their institution and its visitors, participants were asked the question *"Thinking about the institution in which you work, what are the top priorities and interests you consider when planning new museum content to share with your patrons?"* Responses to this question were read and analyzed by evaluators, with several responses considered representative of consistently recurring themes provided below.

Sample of participant responses:

"Educational value, expense, interest generated"

"Interesting, hands-on, multi-age, informative, educational, ease of display, set up and take down"

"Is it relevant? Is it fun and exciting? Is it interactive, multi-sensory, and multi-outcome?"

"1. Science concept to be demonstrated. 2. Accessibility to content by learners of varying ages and science background experiences. 3. Cost of development or acquisition 4. Correlation to state science standards."

"I want to be able to provide an experience for our patrons that they wouldn't be able to have usually in our area. We have a relatively large population of low-income families, and the schools are currently unable to fund many educational field trips, so I try to supplement that whenever possible."

"Relevance to the local area, durability, ability to be self-run (not need an operator/docent), whether the exhibit fits school curriculum and standards."

"We try to choose content that is relevant to current ecological issues, that can be presented in multiple ways to visitors of all ages, that is able to be updated and changed when necessary to keep the exhibit/information fresh for multi-visit users, and like to utilize multi-user exhibits, so that more than one person can use it at one time. We have several climate/weather-focused exhibits, exhibits that focus on different types of power (wind, steam, coal, gas, and others), and several biological-themed stations."

"1. Does exhibit take holistic content approach? Is topic presented within realworld contexts? 2. Does exhibit highlight innovations and creative solutions to problems? 3. Does exhibit explain content relevance to visitors' everyday lives?"

In order to assess the extent to which potential hosting institutions already include (or have previously included) components similar to the LDCM exhibit, participants were asked *"Does your institution currently include, or has it included in the past, any other exhibit(s) pertaining to space, satellites, or Earth's topography and weather?"* Responses were analyzed for museums and science centers alone, for libraries alone, and for the total responding sample, with distinct differences noted between these groups (as illustrated in Table 4). In comparison with libraries and even with the overall sample, museums and science centers were far more likely to report currently including at least one similar exhibit; by contrast, libraries were substantially more likely to have never included such content.

Table 4: Exhibits Relating to Space, Satellites, or Topography/Weather Included at Institution

	Museum and Science Centers (N = 28)		Libraries (N = 47)		Overall (N = 82)	
	#	%	#	%	#	%
Currently includes	16	57.1%	4	8.5%	25	30.5%
Has included in the past, but does not currently include	9	32.1%	17	36.2%	27	32.9%
Has never included	1	3.6%	21	44.7%	22	26.8%
I'm not sure	2	7.1%	5	10.6%	8	9.8%

*Percentages may not add to 100 as a result of rounding

Subsequent to this question, participants who reported that their institution had never included a similar exhibit were asked *"What do you believe to be the primary reason or reasons why your*

institution has thus far chosen not to include an exhibit pertaining to space, satellites, or Earth's topography and weather?" Responses to this question were analyzed, and those considered representative of consistently arising themes are provided below.

Sample of participant responses:

"We have applied for such exhibits, but much to our disappointment we have yet to have this opportunity."

"We have been unable to find one that meets our space and size criteria and is cheap enough to host. Our library does not have much room to spare."

"Opportunity and the fact that only recently has our library included a commitment to including STEM concepts in our programming for youth."

Similarly, participants who reported that their institution either currently included or had previously included space-, satellite-, or topography/weather-related exhibits were asked *"How much would you say your patrons enjoy or have enjoyed the exhibits related to space, satellites, or Earth's topography and weather which are currently open or have been open at your institution?"* In response to this question, 67.3% ($N = 35$) of participants stated "Very much" and 26.9% ($N = 14$) stated "A moderate amount," with only 1.9% ($N = 1$) stating "A small amount," none stating "Not at all," and 3.8% ($N = 2$) stating "I'm not sure." In order to identify the specific types of exhibit currently or previously present at these institutions, participants were also asked *"What topic or topics are or have been covered by the other exhibits related to space, satellite, or Earth's topography and weather which are currently present or have been present at your institution?"* As with all open-ended questions, responses to this question were analyzed for apparent themes, with responses considered representative of these themes provided below.

Sample of participant responses:

"We have a wide array of exhibits covering Hubble, other spacecraft, manned missions, planetary topics, astrophysics, and heliophysics but very little in Earth sciences."

"Curently we have one gallery dedicated to satellite history and usage throughout the past 50 years. It discusses quite a bit about uses for weather, military, emergency, and communications, but not very much about topography."

"Remote Sensing—Earth from Space—Identifying places on Earth using satellites—observing changes on Earth using satellites—tracking hurricanes using satellites—weather forecasting using satellites—using satellites to look out into space—using parts of the electromagnetic spectrum to understand objects in space."

"We have a space and flight exhibit featuring exhibits on zero gravity, history of flight, some physics theories and several simulators (helicopter, F16, flight, control tower)."

"A View from Space traveling exhibit."

> *"Viewing Earth from space (poster exhibit) Viewing space from Earth and space telescopes. Cartography poster exhibit."*

Building upon this question, participants whose institutions currently included these exhibits were asked *"If your institution were to host the NASA LANDSAT exhibit, would you prefer to present it as a stand-alone feature or incorporate it into your existing exhibits related to space, satellite, or Earth's topography and weather?"* Of these participants, 42.3% ($N = 11$) stated that the LDCM exhibit would be incorporated into their existing exhibit(s), 30.8% ($N = 8$) stated it would be used as a stand-alone feature, and 26.9% ($N = 7$) stated that they were not sure. The 11 respondents who stated that it would be incorporated into existing exhibits were then asked two follow-up questions, *"Please name and briefly describe the existing exhibits into which you would incorporate the NASA LANDSAT"* and *"What can we do during planning and construction of this exhibit to help make sure it can be effectively incorporated into your institution's existing exhibit(s)?"* Again, responses to these questions were analyzed for apparent themes, with representative selections of responses to both questions provided below.

> Sample of participant responses ("Please name and describe existing exhibits"):

> *"Why the Sky is our general space exhibit which includes our planetarium which visitors can create their own planetarium show with our cosmic jukebox. Also, included in our exhibit is an ecosphere, magic planet, and interactive exhibits that cover telescopes, the sun and solar events, wavelengths of light, and imaginative play using LEGOS. There is also a chance that we would pair the exhibit with one or more small stand-alone exhibits and in one of our exhibit halls that currently isn't being utilized."*

> *"We have a display about benefits from the space program about 40 by 10 feet. We would put it next to that."*

> *"We could connect it to the role of the sun in weather or heat. Alternatively we could connect satellite images to food production."*

> Sample of participant responses ("What can we do during planning and construction"):

> *"Provide background info for both education and museum staff to assist with accurate interpretation of content and concepts."*

> *"Make the connection that the images are used for helping weather predictions, food production, or other human activities."*

> *"Make age appropriate for families with younger children, support family learning, make it hands on, not lots of text/graphics."*

> *"Make it portable, make it indestructible and make it inter-active/hands-on. It has to do something and not just be a reader board."*

"Flexibility, ability to modify text panels so that they look like part of the existing exhibit."

"I would still use the LANDSAT exhibit as a "stand alone" feature in the gallery. But we would place components in areas that are thematically similar or related."

As an overarching question to help guide exhibit content, all survey participants were asked *"Which of the following potential components of the NASA LANDSAT exhibit do you think would be interesting to your museum's patrons?"* Distribution of responses to this question are provided in Table 5; the suggested topics considered potentially most popular included "Examples of LANDSAT technology in action" and "How LANDSAT technology affects their lives," while "LANDSAT technology and society" and "How long LANDSAT technology has been in use" were selected significantly less frequently. Also provided below are representative responses to the prompt for specific suggestions when participants selected "Other."

Table 5: Components of LDCM Exhibit Considered Interesting to Patrons

	# of respondents	% of respondents (total $N = 82$)
Examples of LANDSAT technology in action	78	95.1%
How LANDSAT technology affects their lives	77	93.9%
How LANDSAT technology can help solve problems	70	85.4%
What LANDSAT technology is	69	84.2%
LANDSAT technology and society	33	40.2%
How long LANDSAT technology has been in use	32	39%
Other (please specify)	5	6.1%

*Participants selected all that applied; as a result, percentages do not add to 100

Sample of "Other" participant responses:

"Future development where LANDSAT tech plays a role."

"How LANDSAT is designed and constructed."

"Where is LANDSAT located?"

Logistics and Planning
Subsequent to questions regarding demographics and existing content and programming, participants were asked *"If your institution were offered the opportunity to host the proposed NASA LANDSAT exhibit as a loan, would you be interested in doing so?"* A total of 74 participants responded to this question, with 85.1% ($N = 63$) saying "Yes," 1.4% ($N = 1$) saying "No," and 13.5% ($N = 10$) saying "I'm not sure, it depends." In order to provide a more detailed understanding of these responses, participants were each asked a follow-up question based upon their expressed interest in hosting the exhibit. Participants who answered "Yes" were asked *"If your institution chooses to host the proposed exhibit, how do you picture the exhibit being*

incorporated into your current exhibit floor, activities, and/or programming?" Those who answered "I'm not sure, it depends" were asked *"What are the main concerns you have which make it difficult to say whether this exhibit would be a good fit for your institution?"* And the one participant who answered "No" was asked *"What is the primary reason why you don't feel this exhibit would be a good fit for your institution?"* Responses to the first two of these three questions were analyzed by evaluators for recurring themes, with selected examples of identified themes provided below. (The one participant who answered "No" declined to provide any elaborative information.)

Sample of participant responses for those who answered "Yes":

"The exhibit would be on the library's public floor, available during operating hours. A series of public programs would be developed around it, and a book/resource pamphlet would be published."

"We have a large lobby that I think could accommodate the exhibit and garner a lot of attention. We also have a large community room if more space would be needed. We would include programs for all ages around the topic of landsat and its role in their lives (weather experiments, global warming, geography, etc.)."

"We would try to place it near our other space-related exhibits. We could use the NASA LCDM exhibit with our school groups as well as with our public programs that we would gear towards that topic."

"We would have a training to teach floor staff and educators how to use it and incorporate it into our in-house education programming. We would probably place it near our Planet 360 exhibit, because it sounds like it would help explain how data used on the Planet 360 software was obtained...kind of like a missing piece of the puzzle! We would also like to have it used by any museum visitors, so we would need to make appropriate signage so that it is easy to understand/use."

"We would offer programs for the Children, Tweens, Teens, and Adults. We would invite guest speakers & astronomers and interactive lessons for the Children's & Teen Departments. The exhibit can be placed in our Great Hall or our spacious corridor between the Fiction & Nonfiction books. Space available: 85" x 18"."

Sample of participant responses for those who answered "I'm not sure, it depends":

"Shipping costs. We are a new museum, and our budget for 2013–2014 is very tight."

"We would need to look carefully at the content."

"Space: we're moving to a new facility very soon & will need some time to examine whether we can bring in outside exhibitions."

As stated earlier, one of the primary objectives of this needs assessment survey was to assess the level of possible funding available for allocation by potential hosting institutions to offset exhibit transport costs. In order to address this question, survey participants were asked *"If you had the possibility to lend the exhibit, what would be the amount that your institution would be able to allocate for shipping expenses?"* Responses to this question are illustrated in Table 6; while these data clearly indicate that museums and science centers are generally able to devote greater funding to exhibit shipping expenses than are libraries, it is also clear that if lower shipping costs can be made feasible, this exhibit may be made available to a much wider range of institutions than would otherwise be possible. Also provided below are representative responses to a prompt for explanation when participants selected "Nothing" or "Other."

Table 6: Maximum Funds Available to Allocate for Shipping Expenses

	Museums and Science Centers ($N = 26$)		Libraries ($N = 42$)		Overall ($N = 73$)	
	#	%	#	%	#	%
More than $2,500	0	0%	0	0%	0	0%
$1,501 to $2,500	1	3.8%	0	0%	1	1.4%
$1,001 to $1,500	2	7.7%	1	2.4%	3	4.1%
$701 to $1,000	5	19.2%	1	2.4%	6	8.2%
$501 to $700	4	15.4%	2	4.8%	6	8.2%
$301 to $500	5	19.2%	7	16.7%	13	17.8%
$100 to $300	6	23.1%	26	61.9%	33	45.2%
Nothing (please explain)	3	11.5%	5	11.9%	11	15.1%

*Percentages may not add to 100 as a result of rounding

Explanations provided by participants who selected "Nothing":

"We have a limited budget and would be able to spare $50."

"We do not have extra money."

"We handle all our own shipping via borrowed truck and trailer."

"We'd try to host the exhibit as economically as possible—perhaps apply for shipping grant?"

In order to permit effective planning and scheduling of exhibit distribution, survey participants were also asked two follow-up questions, *"If your institution chooses to host the proposed exhibit, for approximately how long would you expect the exhibit to remain on the museum floor before being cycled out?"* and *"Do you have any seasonal or other preferences regarding the timeframe during which your institution might host the proposed exhibit?"* (Responses to these questions are illustrated in Tables 7 and 8 respectively.) Again, the responses collected from

museums and science centers differed distinctly from those provided by individuals reporting on behalf of libraries, particularly in regards to the preferred length of hosting time.

Whereas half of those responding from museums and science centers expressed a desire to host the exhibit for as long as possible, this response was not selected even once by library staff members, the majority of whom indicated that short hosting periods (of three months or less) would be optimal for their institution. Responses to the question of seasonal preference were somewhat less divided, with "During the school year" being a common choice regardless of institution type; it is worth noting, however, that in line with the disparity noted above, libraries were much less likely to express no preference than were museums or science centers. Also provided below are representative selections of participant statements of elaboration regarding responses of "Other" for both questions.

Table 7: Length of Time Exhibit Would Remain on Floor

	Museums and Science Centers ($N = 28$)		Libraries ($N = 47$)		Overall ($N = 81$)	
	#	%	#	%	#	%
One month	0	0%	12	25.5%	15	18.5%
Three months	6	21.4%	20	42.6%	26	32.1%
Six months	4	14.3%	1	2.1%	7	8.6%
Nine months	0	0%	0	0%	0	0%
One year	3	10.7%	0	0%	3	3.7%
As long as possible	14	50%	0	0%	14	17.3%
Other (please explain)	1	3.6%	14	29.8%	16	19.8%

*Percentages may not add to 100 as a result of rounding

Elaboration by participants who selected "Other":

"*4–6 weeks.*"

"*6–8 weeks has worked well before.*"

"*Around one month per branch, if we could circulate it through a series of branches.*"

Table 8: Preferred Exhibit Hosting Season

	Museums and Science Centers (*N* = 28)		Libraries (*N* = 47)		Overall (*N* = 81)	
	#	%	#	%	#	%
Spring only	0	0%	0	0%	0	0%
Summer only	1	3.6%	1	2.1%	2	2.5%
Autumn only	0	0%	0	0%	0	0%
Winter only	0	0%	0	0%	0	0%
During the school year	11	39.3%	30	63.8%	46	56.8%
Other or no preference	16	57.1%	16	34%	33	40.7%

*Percentages may not add to 100 as a result of rounding

Elaboration by participants who selected "Other":

"No preference."

"A full year."

"Anytime would be terrific!"

Concluding Thoughts and Participant Suggestions
At the conclusion of the survey, all participants were asked *"Do you have any final questions, comments, or concerns which you'd like to share with us?"* As might be expected, this question resulted in a wide range of responses regarding a number of different topics, both related and unrelated to the LDCM exhibit. Evaluators analyzed these responses and identified themes which emerged on a recurrent basis, with representative selections provided below. In addition to this informal thematic analysis, however, evaluators also selected certain responses on the basis of perceived applicability to the needs assessment's overall purpose and stated objectives; thus, a portion of the examples provided below may not represent common themes, but are instead included to provide a more nuanced body of context for ongoing exhibit development.

Sample of participant responses:

"Will there be training, curriculum, or other resources for the participating organizations?"

"We're nearby—would be interested in visiting OMSI for an overview."

"This sounds like an exhibit that would excite visitors at the library and could interest students into pursuing more science and mathematic classes."

"Maybe work on the language to market this exhibit. Your intro to this survey was highly technical and above the 10th grade average reading level that we seek to market to. We'd need simple, easy to understand sound bites in order to market to families, general public, and the media."

"Is the exhibit accessible to persons with disabilities? Would our insurance be responsible for any liability issues or would there be some type of "short term" protection offered as a supplement to our existing insurance? Is there any training offered prior to hosting the exhibit? If so would it require travel or could it be done by the Internet? Will there be opportunities "to learn from or interact" with other host sites again by way of the Internet or other technologies? What type of evaluation will you expect from the host sites? What "local programming" requirements will there be?"

"We strive to bring new and innovative exhibits and programs to [location information removed]. *We're a little tiny spot on the map, but we serve 25,000 visitors each year. Any time we have an opportunity to appeal to a new audience or hook a young person with content previously unavailable—we jump at the chance! I would be honored to have your exhibit piece on our floor!"*

Discussion and Recommendations

Objective 1: Determine levels of interest in the proposed NASA LDCM exhibit across administrators and staff at potential hosting institutions.
Participants in this needs assessment were clearly excited by the possibility that their institution might have the opportunity to host the exhibit and were eager to be included in future planning and coordination efforts, with only one participant stating that their institution would be uninterested in hosting the exhibit. Additionally, the data collected here indicate that visitors to potential host institutions overwhelmingly find space- and satellite-related exhibits to be moderately to very enjoyable. Bearing these facts in mind, it is recommended that small traveling exhibits such as the NASA LDCM exhibit discussed here be constructed such that delivery to locations distal from a main storage location can be made feasible and cost-effective. It is also interesting to note that numerous participants mentioned they had visited OMSI in the past and had enjoyed partnering with this institution; this finding suggests that it may be advisable to consider inviting members of nearby institutions to serve as peer reviewers when prototype audience testing is being conducted.

Objective 2: Identify any specific reasons for institution non-interest in hosting the proposed NASA LDCM exhibit specifically or space- or satellite-related exhibits in general.
In addition to questions regarding cost, size, and educational value, "audience relevance" was a theme which evaluators identified with relative frequency during assessment of priorities, interest, and potential concerns. It is recommended that every effort be made to ensure that the examples and content presented in small exhibits such as this be as inclusive as possible to reflect the intended target audience(s). Having said this, the lack of availability or opportunity was the single most frequently stated reason for institutions having never hosted exhibits such as the NASA LDCM exhibit, which suggests a definite need for low- or no-cost exhibits to reach otherwise underserved audiences.

One aspect which had been left relatively unaddressed to this point in development of the LDCM exhibit was that of security at host institutions. This point was brought up by multiple survey participants who voiced concerns regarding the placement of the exhibit in high-traffic common areas, particularly in public libraries. In order to address these concerns, it may be advisable to ensure that potentially removable components (e.g., side panels, blocks, and or interface pucks) are locked or attached to the main body, provided such measures do not have a significant negative impact on the overall user experience.

Objective 3: Identify any consistent requests by institution staff and administrators regarding specific properties of the proposed exhibit and specific requests regarding timeframe for hosting.
Museums and science centers requested significantly longer lending periods for the exhibit than did libraries, with the vast majority of libraries requesting lending periods of no more than three months. These data provide support for a seasonal or regional distribution approach when offering small traveling exhibits to libraries; additionally, it is possible (indeed, likely) that some library systems may have the capability to tour a small exhibit within their constituent branches by themselves, if size and weight allowed them to transport the exhibit with their existing resources. Should a scenario arise in which there is interest in exploring and implementing this

idea, it is recommended that short interviews be conducted with a sample of potential hosting library systems to confirm its feasibility. Additionally, the physical structure of small traveling exhibits (e.g., height, ease of interaction) should be designed to accommodate young audience members. Being mindful of ADA requirements for wheelchair access, it may be advisable to consider the inclusion of a stepstool or similar apparatus to maximize ease of access for young children.

Objective 4: Identify existing exhibits at potential hosting institutions which pertain to space, satellites, or related topics and assess whether the proposed LDCM exhibit would be incorporated into any such existing exhibits or would be used as a stand-alone display.
Participants in this study cited a diverse range of existing exhibits and installations at their institutions, including *A View from Space*, *Planet 360*, and numerous educational materials provided by NASA and other organizations. Common recommendations regarding what might be done to facilitate integration of the LDCM exhibit into existing floor plans included modularity to allow drawing attention to the exhibit visually in a public space; some responses also suggested interest in the possibility of adapting content panels. It is understood that modularity is desirable, but the feasibility of this approach cannot help but be influenced by budgetary concerns, as modular exhibits are generally more expensive both to produce and to ship. Even should such concerns preclude the development of a full-blown modular exhibit, however, it may still be possible to provide informational modular panels or other type of banner which may serve as "attention getters."

Objective 5: Identify institution audience demographics which are considered most likely to engage with and make use of the proposed exhibit.
Exhibit content should be accessible to and comprehensible by a wide range of potential audiences; based on the data collected in this study, however, it appeared likely that the visitors considered most likely to make use of the NASA LDCM exhibit were those in the elementary to middle-school age range, making this group the target audience for this particular exhibit. Clearly, however, this finding should not be universally applied to all small traveling exhibits, particularly as this demographic does not completely align with the audience which participants identified as the most frequent visitors to their institutions.

Objective 6: Ascertain what, specifically, professional audience members feel visitors to their institutions would most like to see and experience in regards to the proposed exhibit.
Among all categories of possible content, there were two which appeared to be perceived by survey participants as least relevant to public audience members: "How long LANDSAT technology has been in use" and "LANDSAT technology and society." While there are often many content categories which are deemed indispensible, it is also understood that spatial and technological constraints require choices to be made regarding which content is presented, particularly during development of a small exhibit. It is therefore recommended that content be carefully and conscientiously prioritized, and that particular attention be paid to the ways in which various types of content may be embedded in the holistic audience experience, through images, examples, etc. While certain content will clearly lend itself to explicit verbal presentation, other content—such as that regarding LANDSAT tech and society in the case of the current study—is likely to be an inherent component of the interactive exhibit experience as a whole.

Objective 7: Assess ability of potential host institutions to pay shipping charges associated with transport of the proposed exhibit.

Over 75% of needs assessment participants stated that their institution could afford $500 or less in delivery costs for the exhibit. It should also be noted that while the responses of all participants regarding funds available for delivery skew toward the lower end, museums and science centers were significantly more likely to report greater amounts than were libraries. These data provide further evidence to support a path for critical decision making regarding target institutions, setting criteria for distribution, and the consideration of seasonal or regional strategies or a subsidy system to make the exhibit accessible to as many hosts as possible.

Works Cited

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Appendix A: Needs Assessment Survey Questionnaire

Page 1 Informed Consent

INFORMED CONSENT

The goal of this survey is to assess the extent to which the information presented in the NASA Landsat Data Continuity Mission (LDCM) exhibit currently under development by the Oregon Museum of Science and Industry (OMSI) aligns with your institution's educational goals and needs, as well as to gauge your interest in potentially hosting this exhibit. The information you provide will be used to ensure that the final exhibit suits the needs and interests of potential partner museums.

The survey should take no longer than 15 minutes to complete. Your responses will initially be linked to your e-mail address, but we can assure you that these data will be kept completely confidential. All data will be reported in aggregate (i.e., non-identifiable) formats, and all identifiable information (including e-mail addresses) will be removed before data are reported or disseminated.

The potential risks associated with completing this survey are no greater than those generally experienced in everyday life. Your participation in this survey is entirely voluntary, and you may choose to skip any question or discontinue the survey at any time.

If you have any questions regarding the survey, you may contact Chris Cardiel at ccardiel@omsi.edu. Please complete this survey by Monday, October 8th. Individuals who submit the survey on behalf of their institutions by this deadline, and who indicate that their institutions may be interested in hosting the completed NASA LANDSAT exhibit, will be entered into a drawing to win free shipping of the exhibit.

Thank you for your willingness to participate and for sharing your thoughts and opinions with us – we sincerely value your input!

By clicking "I Agree" below, you are affirming that you have read and understood the information presented above and consent to the terms outlined therein, and that you wish to participate in the survey.

[ ] I Agree
[ ] I do not agree

Page 2 Intro

Several of the questions in the following survey refer to a traveling museum exhibit currently being developed by the Oregon Museum of Science and Industry (OMSI). Please take a moment to read the following synopsis of the planned content and intended learning outcomes of this exhibit before proceeding to the rest of the survey.

OMSI has been subcontracted by Sigma Space Corporation (a contractor to NASA) to develop and construct an interactive traveling exhibit unit that focuses on the "big idea" that Landsat satellite imagery is used to help scientists and planners solve problems on Earth. Images, questions, and information will challenge visitors to think like scientists, study satellite images, and appreciate the technology that addresses the important problems of our dynamic planet. A variety of relevant examples such as how

Landsat is used to detect the most critical trends in natural resource conditions or how satellite sensors will provide seasonal coverage of the global landmass are planned for incorporation in and communication through this design.

This exhibit is intended to engage visitors of science centers and museums, and will consist of one tabletop interactive with two self-standing interpretive panels situated to each side of the interactive, requiring a total of approximately 25ft^2 of floor space. It will require minimal assembly and will not have any special electrical or power requirements. This interactive exhibit will be offered for loan at no charge (excluding shipping fee), to interested ISE institutions.

Working within the framework outlined above for product specifications and learning outcomes, we would like your input to help ensure that the final exhibit aligns with your museum's goals and audience needs. Please consider the above information when responding to the following questions – we look forward to receiving your suggestions!

This image illustrates a concept drawing of the planned NASA LDCM exhibit.

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2. Thinking about the institution in which you work, what are the top priorities and interests you consider when planning new museum content to share with your patrons?

3. Which of the following potential components of the NASA LANDSAT exhibit do you think would be interesting to your museum's patrons? (Please select all that apply.)

[ ] What LANDSAT technology is
[ ] How LANDSAT technology can help solve problems
[ ] How long LANDSAT technology has been in use
[ ] How LANDSAT technology affects their lives
[ ] Examples of LANDSAT technology in action
[ ] LANDSAT technology and society
[ ] Other (please specify)

4. Does your institution currently include, or has it included in the past, any other exhibit(s) pertaining to space, satellites, or Earth's topography and weather?

( ) Currently includes
( ) Has included in the past, but does not currently include
( ) Has never included
( ) I'm not sure

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5. What is/are the topic(s) covered by the other exhibits related to space, satellite, or Earth's topography and weather currently present at your institution?

6. How much would you say your patrons *enjoy* the exhibits related to space, satellites, or Earth's topography and weather currently open at your institution?

( ) Not at all
( ) A small amount
( ) A moderate amount
( ) Very much
( ) I'm not sure

7. If your institution were to host the NASA LANDSAT exhibit, would you prefer to present it as a stand-alone feature or incorporate it into your existing exhibits related to space, satellite, or Earth's topography and weather?

( ) Use it as a stand-alone feature
( ) Incorporate it into existing exhibit(s)
( ) I'm not sure

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8. Please name and briefly describe the existing exhibits into which you would incorporate the NASA LANDSAT.

9. What can we do during planning and construction of this exhibit to help make sure it can be effectively incorporated into your institution's existing exhibit(s)?

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10. What was/were the topic(s) covered by the other exhibits related to space, satellite, or Earth's topography and weather which was/were previously hosted at your institution?

11. How much would you say your patrons *enjoyed* the exhibit(s) related to space, satellite, or Earth's topography and weather which were open at your institution in the past?

( ) Not at all
( ) A small amount
( ) A moderate amount
( ) Very much
( ) I'm not sure

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12. What do you believe to be the primary reason or reasons why your institution has thus far chosen not to include an exhibit pertaining to space, satellites, or Earth's topography and weather?

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13. If your institution were offered the opportunity to host the proposed NASA LANDSAT exhibit as a loan, would you be interested in doing so?

( ) Yes
( ) No
( ) I'm not sure, it depends

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14. If your institution chooses to host the proposed exhibit, how do you picture the exhibit being incorporated into your current exhibit floor, activities and/or programming?

15. If you had the possibility to lend the exhibit, what would be the amount that your institution would be able to allocate for shipping expenses?

( ) $100 to $300
( ) $301 to $500
( ) $501 to $700
( ) $701 to $1000
( ) $1001 to $1500
( ) $1501 to $2500
( ) More than $2500
( ) Nothing (please explain): _____

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16. What is the primary reason why you don't feel this exhibit would be a good fit for your institution?

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17. What are the main concerns you have which make it difficult to say whether this exhibit would be a good fit for your institution?

18. If you had the possibility to lend the exhibit, what would be the amount that your institution would be able to allocate for shipping expenses?

( ) $100 to $300
( ) $301 to $500
( ) $501 to $700
( ) $701 to $1000
( ) $1001 to $1500
( ) $1501 to $2500
( ) More than $2500
( ) Nothing (please explain): _____

19. If your institution chooses to host the proposed exhibit, for approximately how long would you expect the exhibit to remain on the museum floor before being cycled out?

( ) One month
( ) Three months
( ) Six months
( ) Nine months
( ) One year
( ) Other (please specify): _____
( ) As long as possible

20. Do you have any seasonal or other preferences regarding the timeframe during which your institution might host the proposed exhibit?

( ) Summer only
( ) Autumn only
( ) Winter only
( ) Spring only
( ) During the school year
( ) Other or No Preference (please specify): _____

21. What are the most common ages of the visitors to your museum? (Select all that apply)

[ ] Infants (0-2)
[ ] Toddlers (3-5)
[ ] Elementary (6-12)
[ ] Middle School (13-15)
[ ] High School (16-18)
[ ] Young adults (19-35)
[ ] Adults (36-55)
[ ] Seniors (56+)
[ ] Not Sure

_____

22. What age (or age range) of visitor to your museum would you expect to be most likely to use the proposed exhibit? (Select all that apply)

[ ] Infants (0-2)
[ ] Toddlers (3-5)
[ ] Elementary (6-12)
[ ] Middle School (13-15)
[ ] High School (16-18)
[ ] Young adults (19-35)
[ ] Adults (36-55)
[ ] Seniors (56+)
[ ] Not Sure

23. What is or are the most common group composition(s) of visitors to your museum? (Select all that apply)

[ ] Family
[ ] Friends
[ ] Students
[ ] Co-workers
[ ] Out-of-town visitors
[ ] Alone
[ ] Other (please specify)

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24. With which institution are you affiliated?

25. What is your position within your institution?

26. This institution is a/an:

( ) Museum
( ) Science Center
( ) Library
( ) Camp
( ) Outdoor program
( ) Other institution type

27. By participating in this survey you are qualified to enter our drawing for free shipping of the proposed NASA LANDSAT exhibit. Would you like your institution to be entered in this drawing?

( ) Yes
( ) No

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28. Please confirm your contact information or the contact person in case your institution wins the drawing
Name: _____
Position: _____
Phone Number: _____
Email Address*: _____
Street Address: _____
Apt/Suite/Office: _____
City: _____
State: _____
Zip: _____
Country: _____

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29. Do you have any final questions, comments, or concerns which you'd like to share with us?

Page 17 Thank You!

Thank you for participating in our survey! Your response is very important to us.

Your feedback will be invaluable to us as we begin construction of the NASA LANDSAT exhibit discussed above. If you chose to enter the drawing for free shipping of the finished exhibit, we will be selecting and notifying a winner by no later than October 31, 2012.

Thank you again for your time and input - we look forward to collaborating with you again in the future!