

SPACE COMMAND
Summative Evaluation
March, 2003

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INTRODUCTION

The summative evaluation of the Space Command Exhibit has two parts: tracking and timing of visitors in the exhibit and an exit interview. The tracking and timing study began in October, 2002, shortly after the exhibit opened to the public.

TRACKING AND TIMING

Evaluation of the Space Command Exhibit began in October 2002 with a tracking and timing study. A random sample of 100 visitors to the exhibit was tracked and timed. A member of a visiting group was selected at random as the subject. Subjects were tracked from station to station and the time spent at each exhibit or panel was recorded. This gives a measure of the relative attracting and holding power of each exhibit station. After a subject completed a visit, a "sweep" count was made, which involved counting the number of people at each exhibit station. Sweeps give another measure of the relative attracting power of the various stations.

The location and layout of Space Command is somewhat unique in that portions of the exhibit (the Welcome area and Outer Space Outfitters) serve as a corridor for accessing the Planetarium, the 3-D Theater, and the Train Factory Exhibit. As a result, a portion of the sample (22) was comprised of visitors who viewed only those two areas. In order to achieve the most objective evaluation results, these observations were segregated from the other 78 observations and separate tracking and timing statistics were computed for each of the two distinct groups of visitors. These two samples are hereinafter referred to as "complete viewing" and "partial viewing".

- *People are spending a slightly above average time in the Space Command Exhibit as compared to other recent exhibits in the museum. Complete viewing visitors spent an average of 17 minutes in the exhibit. See the following table for a comparative analysis.*

Table 1. Time Spent in Space Command Exhibit

<u>Complete Viewing</u>	
Mean time (minutes)	17
Range (minutes)	4-70
Median (minutes)	13
<u>Partial Viewing</u>	
Mean time (minutes)	8
Range (minutes)	3-21
Median (minutes)	6

Table 2. Comparison of Time Spent in Exhibits

<u>Exhibit</u>	<u>Average Time</u>
Space Command (Complete only)	17 minutes
KidScience	24 minutes
The Sports Challenge	19 minutes
Trains	18 minutes
What About Aids	12 minutes
Science @ Your Fingertips	11 minutes
Franklin – He’s Electric	7 minutes
Average of All Exhibits	15 minutes

- *In terms of “attracting power,” Data Analysis Training was the most popular component of the Space Command exhibit with the complete viewing visitors. Almost as popular were Remote Command and Academy Challenge. Each of these three exhibits attracted at least one-third of the visitors and had an average hold time of approximately four minutes*
- *Other significant times were spent at: Remote Probes; Rove A Rama; Orbit Well; and Resolution/Pin Boxes. As usual, the text panels were among the least popular elements.*

Exhibit Station	Type	<u>Time at Display</u>		<u>Number of Visitors</u>		Score
		Mean	Range	Number	Percent	
Data Analysis Training	Interactive	243	16-1377	32	41.03	9974
Remote Command	Interactive	236	7-1269	30	38.46	9062
Academy Challenge	Interactive	236	5-896	26	33.33	7876
Remote Probes	Interactive	108	5-609	46	58.97	6340
Rove A Rama	Interactive	108	5-873	31	39.74	4285
Orbit Well	Interactive	75	15-219	42	53.85	4023
Resolution / Pin	Interactive	71	10-223	43	55.13	3928

Boxes							
Interplanetary Travel Agency	Interactive	219	12-663	11	14.10	3086	
Life in Space	Interactive	165	12-970	12	15.38	2535	
The Sun's Path	Interactive	49	6-203	40	51.28	2514	
Cooling Arm	Interactive	54	2-215	29	37.18	2015	
Working in Space	Interactive	72	4-202	21	26.92	1942	
Lunch Boxes	Interactive	44	5-135	26	33.33	1458	
Access NASA	Interactive	51	3-181	22	28.21	1450	
Changing Your Weight	Panel	81	7-344	12	15.38	1245	
Air Pressure in Action	Interactive	37	2-169	26	33.33	1218	
Telescope Icon and Screen	Interactive	63	9-174	15	19.23	1210	
What Do You See?	Interactive	44	8-97	21	26.92	1195	
Space Walk Gloves	Panel	44	4-240	17	21.79	958	
Case/Moon Landing/Moon Rock	Panel	45	10-118	12	15.38	691	
Moon Phases/Moon Stories #1	Interactive	41	5-182	13	16.67	687	
Parabolic Mirror	Interactive	23	5-63	19	24.36	568	
The Suits	Panel	36	6-103	11	14.10	503	
Orb Wall Artifacts	Panel	19	4-65	19	24.36	472	
Space Vacations	Panel	337	337	1	1.28	432	
Welcome Aboard	Panel	40	7-99	8	10.26	408	
Space Shuttle Scale	Interactive	49	5-106	5	6.41	312	
Sojourner Mars Rover	Panel	32	6-112	6	7.69	247	
Galactic Anatomy	Panel	35	7-98	5	6.41	222	
See Tomorrow's Rovers	Panel	23	5-94	7	8.97	205	
Space Tools/ Artifacts	Panel	24	7-70	6	7.69	185	
The Sky's Not the Limit	Panel	23	5-52	6	7.69	174	
Chachka Case	Panel	15	7-27	9	11.54	173	
Case/Pre Launch	Panel	18	4-39	7	8.97	159	
Gravity Wells	Panel	39	10-65	3	3.85	149	
Video Intro	Panel	17	3-32	6	7.69	132	
Wondering What's Up	Panel	19	5-39	5	6.41	121	
Shopping for a New Suit	Panel	71	71	1	1.28	91	
Moon Stories #3	Panel	22	5-50	3	3.85	86	
Space Suits Blow-Up	Panel	16	7-25	3	3.85	60	
Space Command Memo	Panel	20	4-35	2	2.56	50	

Cooling Suit	Panel	13	9-20	3	3.85	50
A Star is Born	Panel	10	3-15	4	5.13	49
Moon Stories #2	Panel	32	32	1	1.28	41
I Can See Clearly Now	Panel	30	30	1	1.28	38
The View from Space	Panel	26	26	1	1.28	33
The Big Time	Panel	22	22	1	1.28	28
Viewing the Universe	Panel	14	14	1	1.28	18
Try New Fruit of the Moon	Panel	12	12	1	1.28	15
Reaching for the Stars	Panel	8	8	1	1.28	10
New Planetary Rovers	Interactive	8	8	1	1.28	10
S. A. Wants You	Panel	0	0	0	0.00	0
Do It Yourself	Panel	0	0	0	0.00	0
The Eyes of the Beholder	Panel	0	0	0	0.00	0
Remote Sensing	Panel	0	0	0	0.00	0
Your One Stop	Panel	0	0	0	0.00	0
Space Shop						
Get Away from it All	Panel	0	0	0	0.00	0
Close Out Suits	Panel	0	0	0	0.00	0
Visiting Venus	Panel	0	0	0	0.00	0

(1) Score = percent of visitors times average time at exhibit

- *The partial viewing visitors did not enter the rooms where the most popular exhibits were displayed. Among these visitors, Life in Space, Working in Space, the Interplanetary Travel Agency, and the Lunch Boxes were the most popular.*
- *Scores for these exhibits were higher than the scores recorded for the same exhibits among the complete viewing visitors, but lower than those for the most popular exhibits viewed by the complete viewing visitors.*

Table 3b. Attracting and Holding Power of Displays (Partial Viewing)

Exhibit Station	Type	Time at Display (Seconds)		Number of Visitors (Total = 22)		Score (1)
		Mean	Range	Number	Percent	
Life in Space	Interactive	151	33-493	9	40.91	6168
Working in Space	Interactive	67	9-170	14	63.64	4291
Interplanetary Travel Agency	Interactive	258	19-632	3	13.64	3514
Lunch Boxes	Interactive	30	4-75	15	68.18	2073
Cooling Arm	Interactive	46	12-91	9	40.91	1895
Space Walk Gloves	Panel	66	5-144	6	27.27	1786
Changing Your Weight	Panel	74	10-149	5	22.73	1673
Air Pressure in Action	Interactive	35	12-90	10	45.45	1586
Rove A Rama	Interactive	69	10-208	4	18.18	1250
Space Vacations	Panel	106	93-118	2	9.09	959
Space Shuttle Scale	Interactive	57	7-85	3	13.64	782
Telescope Icon and Screen	Interactive	24	14-43	6	27.27	664
Sojourner Mars Rover	Panel	135	135	1	4.55	614
The Suits	Panel	23	8-37	2	9.09	205
Welcome Aboard	Panel	13	5-22	3	13.64	177
The Sky's Not the Limit	Panel	13	9-17	2	9.09	118
Close Out Suits	Panel	12	12	1	4.55	55
Reaching for the Stars	Panel	0	0	0	0.00	0
Viewing the Universe	Panel	0	0	0	0.00	0
The View from Space	Panel	0	0	0	0.00	0
See Tomorrow's Rovers	Panel	0	0	0	0.00	0
New Planetary Rovers	Interactive	0	0	0	0.00	0
Shopping for a New Suit	Panel	0	0	0	0.00	0
Space Suits Blow-Up	Panel	0	0	0	0.00	0
Cooling Suit	Panel	0	0	0	0.00	0
Your One Stop Space Shop	Panel	0	0	0	0.00	0
Get Away from it All	Panel	0	0	0	0.00	0
Try New Fruit of the Moon	Panel	0	0	0	0.00	0
Space Tools/ Artifacts	Panel	0	0	0	0.00	0
Visiting Venus	Panel	0	0	0	0.00	0

(1) Score = percent of visitors times average time at exhibit

Table 4. Demographics of Tracking and Timing Sample

	<u>Complete Viewing</u>		<u>Partial Viewing</u>		<u>Total Sample</u>	
	Number	Percent	Number	Percent	Number	Percent
Boys	22	28	9	41	31	31
Girls	31	40	7	31	38	38
Adult Males	10	13	3	14	13	13
Adult Females	<u>15</u>	<u>19</u>	<u>3</u>	<u>14</u>	<u>18</u>	<u>18</u>
Total	78	100	22	100	100	100

SWEEPS

A total of 100 sweeps were completed during the timing and tracking study. As mentioned above, sweeps give us another way of determining the relative appeal of different exhibit components. As can be seen from the sweeps table, the results are similar to the tracking and timing measures. The advantage of doing sweeps is that it expands the sample size and gives input from many more visitors.

Table 5. Sweeps: Number and Percent of Visitors

<u>Exhibit Station</u>	<u>Type</u>	<u>Number of Visitors (Total = 3,269)</u>	
		<u>Number</u>	<u>Percent</u>
Remote Command	Interactive	319	9.76
Remote Probes	Interactive	283	8.66
Orbit Well	Interactive	240	7.34
Rove A Rama	Interactive	223	6.82
Data Analysis Training	Interactive	205	6.27
Resolution / Pin Boxes	Interactive	196	6.00
Cooling Arm	Interactive	191	5.84
Working in Space	Interactive	136	4.16
Academy Challenge	Interactive	129	3.95
Life in Space	Interactive	125	3.82
Lunch Boxes	Interactive	115	3.52
The Sun's Path	Interactive	114	3.49
Interplanetary Travel Agency	Interactive	107	3.27
What Do You See?	Interactive	94	2.88
Air Pressure in Action	Interactive	92	2.81
Parabolic Mirror	Interactive	71	2.17
Space Walk Gloves	Panel	66	2.02
Access NASA	Interactive	63	1.93

Sojourner Mars Rover	Panel	48	1.47
Telescope Icon and Screen	Interactive	47	1.44
Orb Wall Artifacts	Panel	44	1.35
See Tomorrow's Rovers	Panel	42	1.28
Moon Phases/Moon Stories #1	Interactive	30	.92
Case/Moon Landing/Moon Rock	Panel	28	.86
New Planetary Rovers	Interactive	28	.86
The Suits	Panel	28	.86
Galactic Anatomy	Panel	26	.80
Space Vacations	Panel	23	.70
Changing Your Weight	Panel	22	.67
Space Shuttle Scale	Interactive	20	.61
Welcome Aboard	Panel	16	.49
The Sky's Not the Limit	Panel	13	.40
Chachka Case	Panel	10	.31
I Can See Clearly Now	Panel	7	.21
Space Suits Blow-Up	Panel	7	.21
Try New Fruit of the Moon	Panel	7	.21
Gravity Wells	Panel	6	.18
Remote Sensing	Panel	6	.18
Cooling Suit	Panel	6	.18
Space Tools/Artifacts	Panel	6	.18
The Big Time	Panel	5	.15
Reaching for the Stars	Panel	5	.15
Wondering What's Up	Panel	3	.09
Case/Pre Launch	Panel	3	.09
Get Away from it All	Panel	3	.09
Visiting Venus	Panel	3	.09
Viewing the Universe	Panel	2	.06
Video Intro	Panel	2	.06
Space Command Memo	Panel	2	.06
A Star is Born	Panel	1	.03
Shopping for a New Suit	Panel	1	.03
The View from Space	Panel	0	0.00
S. A. Wants You	Panel	0	0.00
Moon Stories #2	Panel	0	0.00
Moon Stories #3	Panel	0	0.00
Do It Yourself	Panel	0	0.00
The Eyes of the Beholder	Panel	0	0.00
Your One Stop Space Shop	Panel	0	0.00
Close Out Suits	Panel	0	0.00

EXIT INTERVIEWS

Exit interviews were conducted between January 2, 2003 and March 6, 2003 with 75 groups as they left the Space Command exhibit.

Table 6: Demographics of Interview Sample

Demographic	Number of Visitors	Percent
<u>State of Residence</u>		
Pennsylvania	48	65%
New Jersey	14	19%
New York	6	9%
Delaware	3	4%
Florida	1	1%
Ohio	1	1%
Japan	1	1%
<u>Age Range</u>		
Under 10	17	5%
10-14	124	37%
15-19	39	12%
20-29	20	6%
30-39	33	10%
40-49	31	9%
Over 49	69	21%
<u>Number in Group</u>		
1	3	4%
2	18	24%
3	24	32%
4	10	13%
5	7	9%
6+	13	18%
<u>Nature of Group</u>		
Family	32	42%
School group	20	27%
Friends	14	19%
Tour group	5	7%
Alone	3	4%
Family and friends	1	1%

Sex of Group		
Adult males	79	18%
Adult females	113	26%
Boys	129	29%
Girls	118	27%

- *Most of the visitors were from Pennsylvania and New Jersey. The most frequent age of the visitors was 10-14. People came in groups of 2-3. Most visitors came as a family or school group.*

What brought them to the Exhibit

- *More than one-third of the visitors were in the exhibit because they came to see it. The majority of visitors found the exhibit while exploring the museum or while on their way to see other exhibits.*

Table 7: Why Did You Visit the Exhibit?

Responses	Number of Responses	Percent
Came to see it	27	36%
Exploring the museum	23	30%
On way to planetarium	15	20%
On way to 3-D theater	5	7%
On way to other exhibits	5	7%

Table 8: How Did You Find the Exhibit?

Responses	Number of Responses	Percent
Exploring the museum	62	83%
Internet	5	7%
Museum map	2	3%
Museum signs and banner	2	3%
Have visited it before	1	1%
Saw construction on prior visit	1	1%
Word of mouth	1	1%
Telephone	1	1%

Expectations

- *Since the largest group of visitors had not heard of the exhibit in advance, they had no particular expectations.*

Table 9: Visitor Expectations

Expectation	Number of Responses	Percent
Space travel story	2	14%
Astronomy information	2	14%
Astronomy science activities	1	7%
All of the above	9	65%

All (100%) of the visitors said they saw what they expected to see. One visitor also wanted to see a big planet.

Impressions

Table 10: What is the Exhibit About?

Responses	Number of Responses	Percent
Space travel & exploration	27	36%
Astronomy	17	23%
Space technology & equipment	16	21%
Astronauts & space program	10	13%
Living & working in space	5	7%

Table 11: What is the Exhibit's Setting?

Responses	Number of Responses	Percent
In orbit	33	44%
On Earth	26	35%
On the Moon	7	9%
On Mars	5	7%
On Earth & in orbit	2	3%
On Earth & Mars	1	1%
On some planet	1	1%

Table 12: What is the Date of the Exhibit?

Responses	Number of Responses	Percent
The present	38	51%
Within the next 10 years	13	17%
More than 10 years from now	9	12%
Don't know	8	11%
The past	7	9%

Remote Command

Twenty-nine percent of the 75 groups interviewed played the three-person Remote Command game. The people interviewed were asked to rate the game on a scale from 1 to 5, with 5 being the highest.

Table 13: Rating the Remote Command Game

Rating	Responses	Percent
5	5	23%
4	9	41%
3	8	36%
2	0	0%
1	0	0%

- *The average rating was 3.9 on a 5-point scale.*

Favorite Exhibits

Table 14: Favorite Exhibit

Exhibit Station	Type	Responses	Percent
Data Analysis Training	Interactive	10	13%
Remote Command	Interactive	9	12%
The Suits	Panel	6	8%
Telescope Icon and Screen	Interactive	4	5%
Resolution/ Pin Boxes	Interactive	4	5%
Rove A Rama	Interactive	4	5%
Interplanetary Travel Agency	Interactive	4	5%
Working in Space	Interactive	4	5%
Air Pressure in Action	Interactive	3	4%
Lunch Boxes	Interactive	3	4%
Moon Phases/Moon Stories #1	Interactive	2	3%
Orbit Well	Interactive	2	3%
Remote Probes	Interactive	2	3%
Shopping for a New Suit	Panel	2	3%
Welcome Aboard	Panel	1	1%
Case/Moon Landing/MoonRock	Panel	1	1%
What Do You See?	Interactive	1	1%
Academy Challenge	Interactive	1	1%
Access NASA	Interactive	1	1%
Life in Space	Interactive	1	1%
Space Walk Gloves	Panel	1	1%
No Favorite	N/A	9	12%

- *Visitors' favorite exhibits were consistent with the results from the tracking and timing survey. Interactive exhibit stations accounted for twelve of the first fourteen favorites.*

Problems with Exhibits

Visitors were asked if there were any exhibits that were too difficult or that they couldn't get to work. Most visitors (75%) did not report any problems with the Space Command exhibit. The remaining 25% identified the following exhibits as too difficult or not working.

Table 15: Difficult and/or Non-Working Exhibits

Exhibit	Broken	Difficult	Total Problems	Percent of Problems	Percent of Visitors
Data Analysis Training	4	2	6	24%	8%
Air Pressure in Action	3	2	5	20%	7%
Working in Space	4	0	4	16%	5%
Remote Command	2	0	2	8%	3%
Interplanetary Travel Agency	1	1	2	8%	3%
Cooling Arm	2	0	2	8%	3%
Computer exhibits in general	0	2	2	8%	3%
The Sky's Not the Limit	0	1	1	4%	1%
Rove A Rama	0	1	1	4%	1%

- *The most frequent problem (84% of total problems) was broken exhibits, with Data Analysis Training, Working in Space and Air Pressure in Action being reported out of action most often.*
- *Five visitors (7% of total) reported problems with more than one exhibit.*

What They Learned

When asked to describe something they had learned about space from the exhibit, 65% of the visitors interviewed said they had learned something.

Table 16: What Visitors Learned

Responses	Number of Responses	Percent
Space suits	18	24%
Weights on planets	11	15%
Planets, earth, moon	8	11%
Space exploration	6	8%
Stars	2	3%
Air pressure	2	3%
Pixels	1	1%
Nothing	26	35%

- *Almost one-fourth of visitors reported learning something new about space suit technology and cooling systems.*

- *The Lunch Boxes exhibit station also produced several responses as eleven visitors reported learning that weights of an object or person vary on different planets.*

Overall Evaluation

Visitors were asked to rate their overall experience in the Space Command exhibit on a five-point scale. The five points were as follows: excellent (5); very good (4); OK (3); fair (2); and poor (1).

Table 17: Overall Rating of Space Command

Category/Rating	Mean Rating	Number of Visitors	Percent of Visitors
Overall Experience	4.19		
Excellent		21	28%
Very Good		47	63%
OK		7	9%
Fair			
Poor			
Printed Explanations	4.16		
Excellent		18	24%
Very Good		53	71%
OK		3	4%
Fair			
Poor		1	1%
Exhibit Design	4.17		
Excellent		20	27%
Very Good		48	64%
OK		7	9%
Fair			
Poor			

Desire to Return

Of the 75 groups interviewed, 72 (96%) said they would return to the Space Command exhibit. Three of the groups had members who had previously visited the exhibit. All said they would visit again if they came back to TFI.

Suggestions

Of the 75 groups interviewed, 28 (37%) offered suggestions for improving the exhibit. Fifteen groups wanted more interactive exhibits, with eight of the fifteen suggesting that there should be a space craft for visitors to walk through. Other suggestions received from more than one group were to improve maintenance, raise or lower the target age level and to lower the lighting and sound levels.

Conclusions

Space Command, like KidScience, Sports Challenge and Trains, is appealing to visitors and is entertaining and informing them for significant periods of time. Visitors rate the exhibit highly, with mean scores for design, printed explanations and overall experience all in excess of 4.15 on a 5-point scale.

The interactive exhibit stations are the most popular, with the highest attracting and holding power and the highest number of visitors recorded during sweeps. Some interactive exhibit stations (Data Analysis Training, Working in Space and Air Pressure in Action) experienced down time, with 14 of 75 visitor groups (19%) reporting that at least one exhibit station they visited was not working. The most popular visitor suggestion was to increase the number of interactive exhibits.