Space Suits and Crew Survival Systems Branch Education and Public Outreach Support of NASA's Strategic Goals in Fiscal Year 2012

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As NASA plans to send people beyond low Earth orbit, it is important to educate and inspire the next generation of astronauts, engineers, scientists, and the general public. This is so important to NASA's future that it is one of the agency's strategic goals. The Space Suits and Crew Survival Systems Branch at Johnson Space Center (JSC) is actively involved in achieving this goal by sharing our hardware and technical experts with students, educators, and the general public and educating them about the challenges of human space flight, with Education and Public Outreach (EPO). This paper summarizes the Space Suit and Crew Survival Systems Branch EPO efforts throughout fiscal year 2012.

Introduction

The NASA agency, Johnson Space Center (JSC), and the Space Suit and Crew Survival Systems Branch (EC5) all continue to promote past, present, and future space suit technologies to the general public as one of their strategic goals. The fiscal year (FY) 2012 was the first full year that the EC5 branch EPO team was working under the Crew and Thermal Systems Division's (CTSD) Strategic Communication group. In this paper, the FY12 EC5 EPO metrics will be summarized.

During FY12 the EC5 EPO objectives continued "to support hands-on, interactive, educational experiences so that students of all ages and levels may learn about the design and operational challenges associated with EVA technologies developed in support of NASA exploration initiatives" [1]. The EPO coordination process continues to be updated to: increase communication between requestors, coordinators, and volunteers; make coordination of volunteers, hardware, and facilities more efficient; and to make it easier for volunteers to support events. Additionally the EC5 EPO and CTSD Strategic Communication group work to continue to stay in-line with the JSC Speakers Bureau process.

FY12 EPO Summary and Metrics

This fiscal year resulted in the Space Suit and Crew Survival setting a new year-end record completing a total of 410 events. Figure 1 shows the event breakdown for each quarter of the fiscal year. With 357 events, a majority of the events were interactive presentations in classroom and subject matter expert and tours. Through the course of the year, EC5 also participated in 24 media events, featuring the current and advanced space suit technologies and the branch personnel. 24 mentoring opportunities were also completed, with volunteers working with teams from the Microgravity University (Reduced Gravity Office) and the Texas Aerospace Scholars Programs throughout the year. Finally, five test/analogs were supported from the EC5 EPO prospective.

Event Type	Q1	Q2	Q3	Q4	FY2012
EPO Presentation	32	47	64	24	167
Subject Matter Expert (SME)	44	50	55	41	190
Media	3	8	4	9	24
Mentoring	5	10	8	1	24
Tests/Analog Support	0	0	0	5	5
TOTAL:	84	115	131	80	410

Figure 1: Summary of EC5 EPO Events for FY12

For the past three fiscal years, similar data was collected. The year-end totals for those years were as follows; 72 events in FY09, 158 events in FY10, and 253 events completed in FY11. Therefore for this is the second year in a row, with a greater than 1.5 times increase in event totals from the previous fiscal year. Figure 2 shows the breakdown of events per month for FY10-FY12.

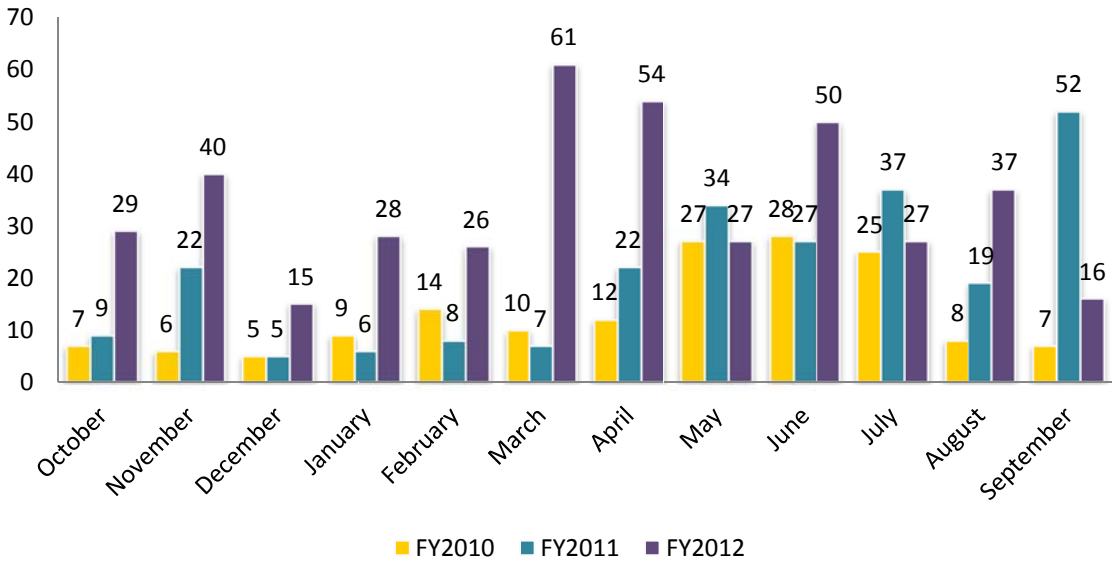

Figure 2: Monthly Event Totals for the Last Three Fiscal Years

As was the case in the past, EC5 EPO continues to track event locations, following the JSC Education Office and Public Affairs Office requirements regarding events within or outside of 50 miles of JSC. Over 300 events took place on-site at JSC in one of our CTSD locations or within 50 miles of JSC. This year 30 events were in Texas, but outside of Houston and 46 within the United States, but outside Texas. Additionally, 33 events took place internationally this year a significant increase from previous years.

Event Location	Q1	Q2	Q3	Q4	FY2012
On-Site CTSD Facilities	39	42	36	33	150
Within 50 miles of JSC	34	46	44	27	151
Exceeding 50 Miles of JSC, but in TX	8	1	14	7	30
Out of State USA	3	16	14	13	46
International	0	10	23	0	33
TOTAL:	84	115	131	80	410

Figure 3: Summary of EC5 EPO Events by Location for FY12

The Space Suit and Crew Survival Systems Branch EPO team also tracks the amount and type people at each event. Just within this year, EC5 EPO reached out to 34,588 people.

In total this was a decrease in overall event audience totals from FY11 by more than 17,000 people. A vast majority of the higher audience numbers in FY11 (51, 837 total participants), was caused by the End-of-Shuttle type events. Figure 4 shows the audience type by quarter throughout the fiscal year.

Audience Type	Q1	Q2	Q3	Q4	FY2012
K-5	461	1,881	3,153	446	5,941
Middle School	1,795	2,979	2,243	17	7,034
High School	2,500	2,562	3,619	294	8,975
College	122	131	60	75	388
Educators	5	581	70	375	1,031
General Public	2,526	1,490	2,051	3,466	9,533
Professional	101	542	543	370	1,556
Media	16	45	12	57	130
TOTAL AUDIENCE:	7,526	10,211	11,751	5,100	34,588

Figure 4: Summary of EC5 EPO Audience Type for FY12

An additional metric was collected for this first time during FY12, called the "Focus". This captured the difference between the outreach events, which make up 89% of the overall events supported, In-Reach events (08%), and Commercialization type events (03%).

Featured FY12 EPO Accomplishments

This fiscal year the focus was on using feedback from our event requestors and volunteers to improve the overall EC5 EPO process. The event requestor had a 44% response rate and all positive responses. The feedback received suggests the following:

- Presentation meets requestors' expectations
- Volunteers are recognized as knowledgeable
- Volunteers are organized and professional
- Overall, the event/presentation is considered useful
- All who replied would recommend the event to other educators

Additionally the 94 currently trained EC5 EPO volunteers were surveyed during FY12, from those there was a 38% response rate. The findings from those which replied are discussed below. 28% of volunteers support specific events; volunteers who support the same event every year make up 8% of the responses, where 64% would support any

event as time permits. A majority of volunteers (72%) believe that they support 1-3 events annually and the same percentage of volunteers cited the biggest challenge to supporting EC5 EPO events as "work load". It should be noted that this fiscal year 34% of our 94 trained volunteer supported an event this year.

Featured FY12 EPO Events

Shuttlebration:
Visitors from all over gathered on Clear Lake near JSC for the arrival of a full-scale Space Shuttle mock-up to Houston and Space Center Houston on June 1st and then again on June 3rd while the replica made the slow-and-steady journey to SCH, its permanent home. About 10 volunteers supported these events; bring out the two suits worn during the Space Shuttle program (the EMU and ACES).

Figure 5: EC5 engineers, Mallory Jennings and Alex Langford, spend time with guest from all ages visiting the Shuttlebration event

Figure 6: NASA engineer, Bill Arceneaux tells visitors all about the space suit

2012 JSC Open House:
For the first time in many years, the Crew and Thermal Systems Division setup for the JSC Open House, which is part of the RE/MAX Ballunar Liftoff Festival, in building 32. For this event JSC opens its gates to the general public for one day to allow them to see all that is going on at the center. This was a special setup, since building 32 is the home of two of the world's largest vacuum chambers, with the EMU, ACES in an Orion seat mockup, as well as advanced EVA hardware (the Z-1 space suit, advanced PLSS hardware, and a variety of suitport concepts). Figures 7-10 provide photos from the event.

Figure 7: EC5 Branch Chief, Raul Blanco, assisted with presentations to the B32 visitors about the CTSD display

Figure 8: JSC Open House Visitors interact with NASA Space Suit Engineer, Dana Valish, regarding the advanced suitport

Figure 9: Cody Kelly, Life Support Engineer, talks to Open House guest about the current EMU hardware

Figure 10: With Chamber A in the background, Cinda Chullen, Life Support Engineer, Cinda Chullen engages visitors with many pieces of advanced life support equiptment

Conclusions

This paper presents a summary of the EVA Systems EPO events and metrics for fiscal year 2012. The metrics indicate that FY12 showed a significant increase of events supported and audience compared to the last three fiscal years (2009, 2010, and 2011), indicating that EC5 EPO teams were able to coordinate more support with the increased number of events. The Space Suit and Crew Survival Systems Branch EPO support is planned for fiscal year 2013, and early metrics indicate that the numbers should be comparable to the FY 2012 metrics with events audience participants.

REFERENCES

1. Paul, Heather; Mallory A. Jennings, and Erika Guillory Lamberth. *Extravehicular Activity Systems Education and Public Outreach in Support of NASA's STEM Initiatives in Fiscal Year 2011*. AIAA-2012-3586, 42nd International Conference on Environmental Systems, San Diego, California, July 15-19, 2012.
2. Texas Aerospace Scholars website, http://tas.aerospacescholars.org