JSC/EC5 U.S. Spacesuit Knowledge Capture (KC) Series Synopsis

All KC events will be approved for public using NASA Form 1676.

This synopsis provides information about the Knowledge Capture event below.

Topic: Real-Time EVA Troubleshooting

Date: June 18, 2013 **Time:** 11:30-12:30 pm **Location:** JSC/B5S/R3102

DAA 1676 Form #: 29247

A PDF of the presentation is also attached to the DAA 1676 and this is a link to all lecture material and video: \\js-ea-fs-03\pd01\EC\Knowledge-Capture\FY13 Knowledge Capture\20130618 Leestma_STS-41G EVA\For 1676 Review and Public Release

*A copy of the video will be provided to NASA Center for AeroSpace Information (CASI) via the Agency's Large File Transfer (LFT), or by DVD using the USPS when the DAA 1676 review is complete.

Assessment of Export Control Applicability:

This Knowledge Capture event has been reviewed by the EC5 Spacesuit Knowledge Capture Manager in collaboration with the author and is assessed to not contain any technical content that is export controlled. It is requested to be publicly released to the JSC Engineering Academy, as well as to CASI for distribution through NTRS or NA&SD (public or non-public) and with video through DVD request or YouTube viewing with download of any presentation material.

Presenter: David Leestma

Synopsis: David Leestma was EV-1 for the STS-41G extravehicular activity (EVA) with Kathy Sullivan (first American female spacewalker). They conducted an EVA to fully demonstrate the feasibility of refueling satellites from the Space Shuttle, and performed the first contingency EVA task involving the Ku-band antenna. STS-41G was the fourth Space Shuttle mission to perform an EVA, and Leestma related his experiences with training, the spacesuit, and EVA tasks that were conducted on October 11, 1984 during this mission.

Biography: David Leestma grew up during the years of Sputnik and early space-flight programs with a desire to explore. He was graduated first in his class from the U.S. Naval Academy in 1971, obtained his master of science in aerospace engineering in 1972, and flew F-14s in the Navy until his selection as an astronaut in 1980. He has flown three shuttle missions (STS-41G, STS-28, and STS-45) and logged 532.7 hours in space. He has held a variety of senior positions at the Johnson Space Center including director, Flight Crew Operations; deputy director, Engineering; deputy program manager, Space Launch Initiative; program manager, Orbital Space Plane; and, currently, manager, Technology Transfer and Commercialization Office.

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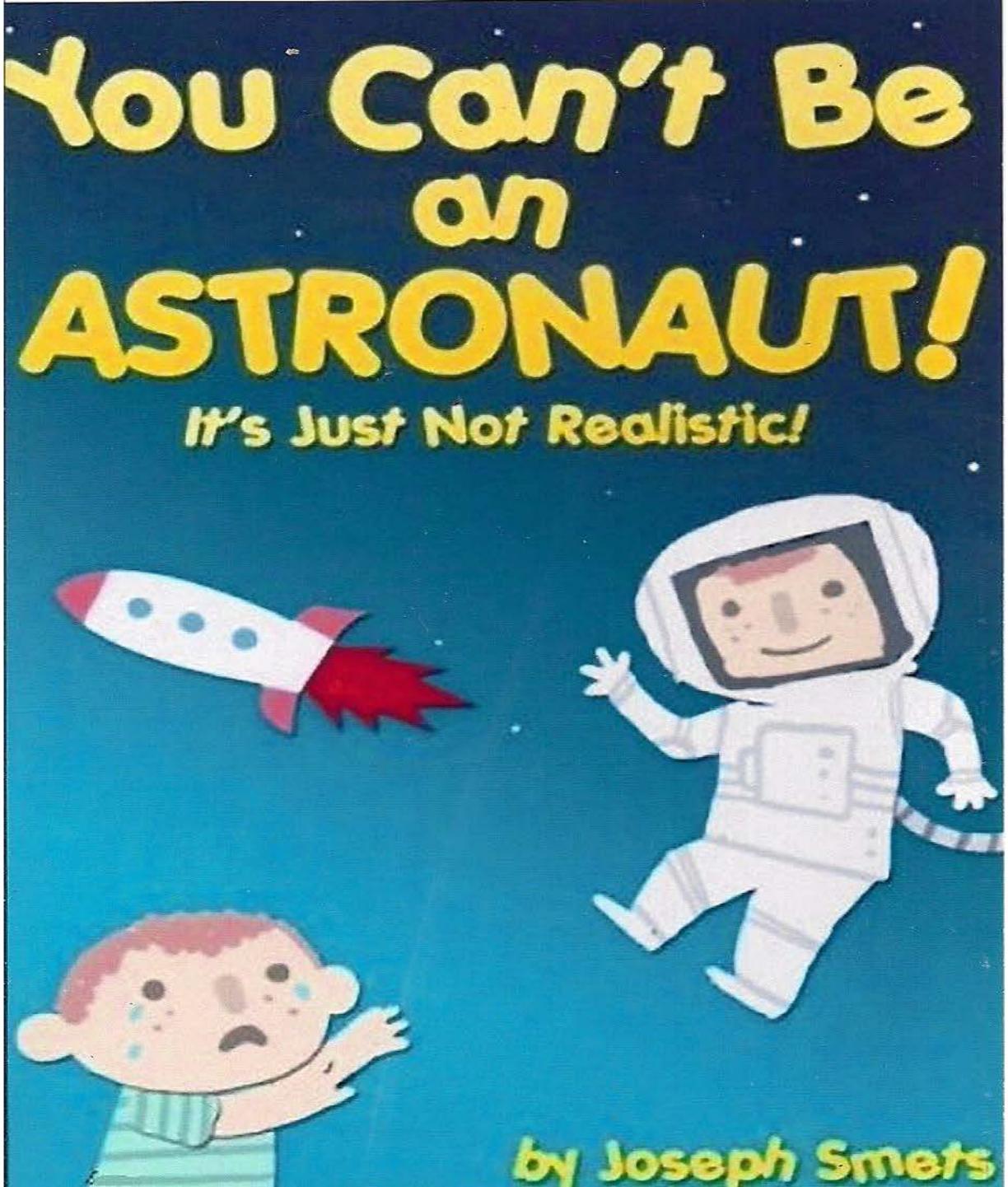
You Can't Be an ASTRONAUT!

It's Just Not Realistic!



by Joseph Smets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NASA
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EV3
EV2

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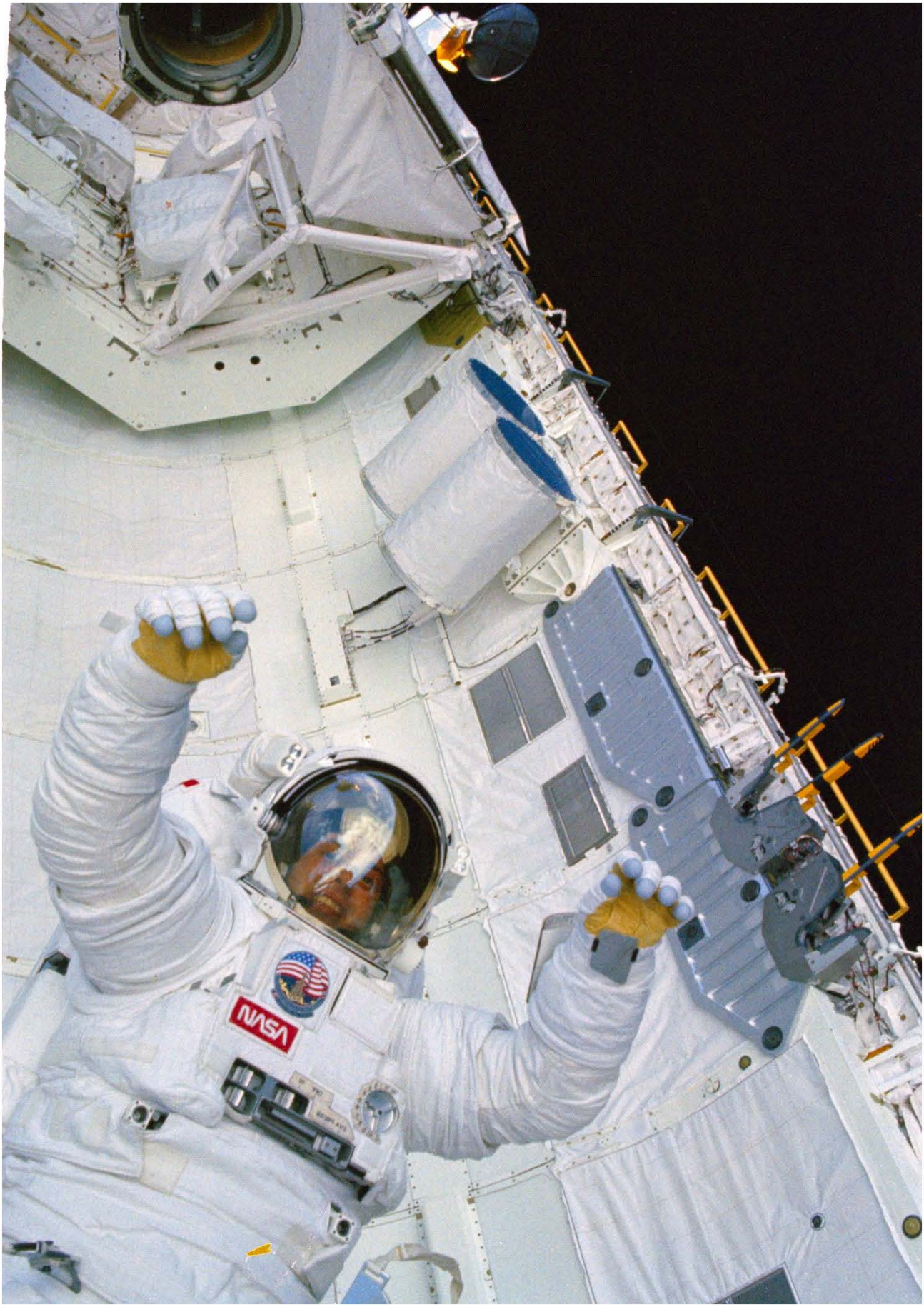
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ORS EVA Lessons Learned

1. Design tasks for gross motor skills as much as possible
2. Use power tools when/where appropriate
3. Ensure proper restraints are available and located correctly
   - Including handholds, translation paths, etc.
   - Make them part of the design and not added later
4. Make fit/function checks of flight hardware MANDATORY.
5. Make timelines conservative in new areas – expect the unexpected
6. Never change anything at the last minute that has a proven record of reliability

   (i.e., ORS tool grease, special wire, etc.)
7. Involve crew early-on – critical

ORS EVA Lessons Learned (cont'd)

8. Require early input from safety, quality assurance etc.
9. Training mockup fidelity is very important at all facilities - SST, Lab, NBL, etc.
10. Hydrazine decontamination was a big issue
11. EVA was at least a 3 person task (2 EVA – 1 $^{+}$ IVA)
12. Configuration control is critical – ensure documentation, hardware and procedures all integrate
13. In-house projects are strong motivators – increase productivity, improve engineering capability, cooperative environment, reduce lead times, cost savings, great training for new personnel.
14. Use only unmarried neutered orphans for in-house projects, to simplify worker exploitation!