Effective Teamwork:
The EVA NBL Experience

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EVA Basics

- **What is Extravehicular Activity (EVA)?**
  - Commonly known by the public as spacewalks
    - US EVA's are performed in the Extravehicular Activity Mobility Unit (EMU)
- **What is the EMU?**
  - An independent anthropomorphic system that provides environmental protection, mobility, life support and communication equipment necessary for a crewmember to perform a US EVA

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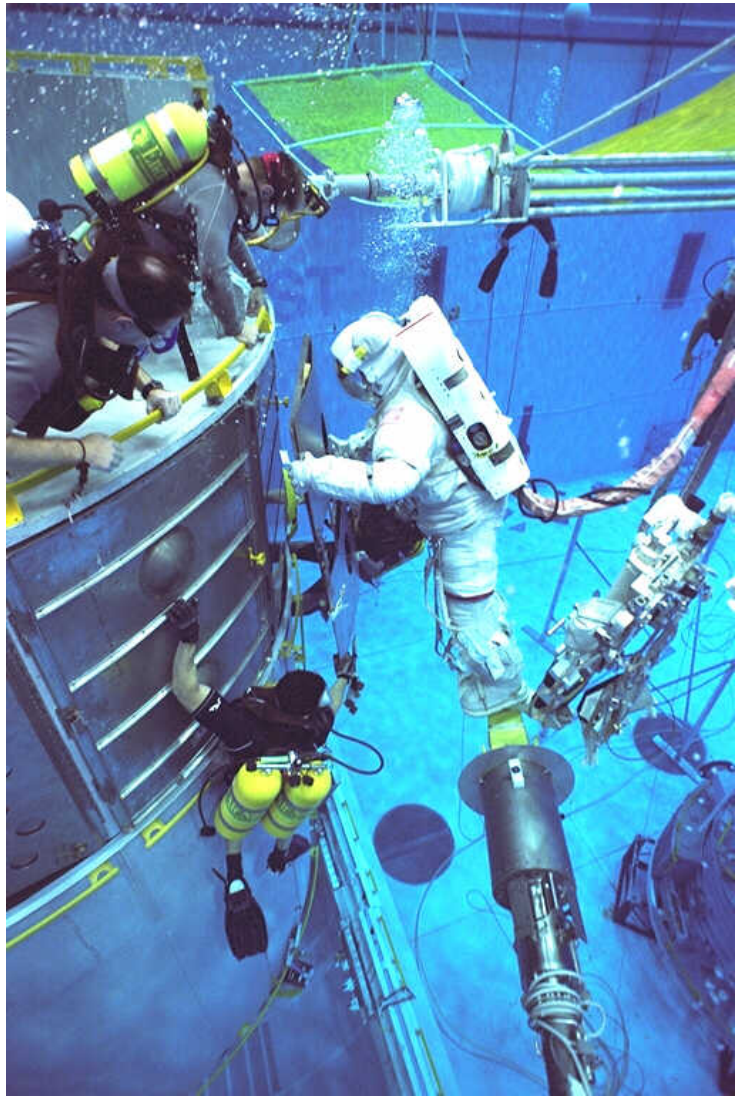
EVA Basics



- **What is the NBL?**
  - Neutral Buoyancy Laboratory
    - Neutral buoyancy describes something that has an equal tendency to float as it does sink
      - Simulates microgravity environment
    - Allows crewmembers to work with tools in a simulation of EVA
    - A significant portion of EVA training is accomplished in the NBL
      - An NBL run (and sometimes two) occurs almost every day

EVA Basics

- **What is the NBL EMU lab?**
  - Lab repairs, assembles, and tests all the EMUs that are used in NBL runs, and other types of training events
  - High volume work atmosphere providing 3-4 EMUs per day
  - Lab personnel help astronauts don and doff the suit for their NBL run
  - Personnel monitor the NBL runs and deal with any real-time EMU issues that arise

EVA Basics

- **What is the EVA Office?**
  - The EVA Office integrates NASA's EVA assets
    - EVA space suit development/sustaining engineering
    - EVA tools and crew aids development /sustaining engineering
    - Flight / training hardware processing
    - Mission integration
    - Crew training
  - As such, owners of the NBL EMU lab contract
- **Why do you care about EVA, EMUs, or the NBL?**
  - We have learned some valuable lessons, due to issues encountered in the NBL EMU lab, on how to work as a NASA/contractor team to resolve issues in the operational phase of a project
    - Turning around a struggling organization
    - Importance of employee morale
    - Criticality of listening to and communicating with working troops

Background

- **History**
  - The NBL EMU lab has been in place since 2001, and the same work had been accomplished previously in other locations (by the same employees)
  - We began having issues with the quality of hardware that was being produced by the NBL EMU lab (henceforth called the “suit lab”)
    - Hardware problems were being encountered while astronauts were donning their suits for an NBL training run, so the issues were highly visible
  - Customers external to the suit lab began to lose confidence in their products
  - Following a series of highly visible issues, NASA elected to have a temporary safety stand-down at the NBL
    - NASA and our contractor implemented corrective actions at the suit lab
      - Increased detail in procedures
      - Retraining
      - More surveillance (NASA Quality, Contractor Quality, suit technicians from other contractors)
    - Corrective action input largely came from sources external to the suit lab, not the suit lab employees themselves

Background

- **Results**
  - Issues continued
  - Initially, production slowed down SIGNIFICANTLY due to additional paperwork
    - Production later improved, but not to the previous level, and not without continued high-profile issues
  - Morale in the suit lab plummeted
  - I was sent as a full-time NASA representative to help determine what was needed to resolve the continuing issues
- **Then what?**
  - Contractor reorganized
    - Dedicated operations manager assigned to integrate across the organization and work with external customers
  - We worked AS A TEAM to address the issues

Lessons Learned

- **Turning a struggling organization around as a NASA/contractor team**
  - To understand what needs to be fixed, you have to understand what is wrong!
    - Resist the urge to assume you know what the issues are, or to rely on what someone else tells you
    - Be a truly neutral observer
    - Request feedback from ALL levels of the organization on what problems need to be fixed to resolve the organizational issues
    - You will quickly see that even the most specific issue mentioned falls into a broad, overall category
      - Feedback in the case of the NBL suit lab was categorized into morale, inventory, work flow, external interfaces, manpower, and communication – there were no issues, however small or specific, that could not be boiled down into one of these areas
  - Help organization management understand your evaluation of the major categories of issues that need to be addressed
    - Let organization management come up with the fixes whenever possible
    - Help with specific parts of the fix where appropriate (resources, NASA policy, etc.)
  - Advertise the successes of the organization (Early! Often! At the end!)

Lessons Learned

- **Importance of employee morale**
  - It quickly became clear that employee morale in the suit lab was dangerously low
    - No one wanted to be there anymore
    - Everyone was afraid of being shut down again
    - They felt like the left out step-children of the facility (resources, floor space, etc.)
    - Because the NBL suit lab was viewed as a “training ground” for flight work, promotions to higher levels were rare
  - Morale was influencing the ability for lab personnel to concentrate
  - Morale was causing a great deal of apathy among employees
  - Improvements came quickly when NASA and contractor management spent time trying to help
  - Contractor management re-evaluated the skill mix required in the lab, and provided additional higher level positions (and promotions!)

A plan for maintaining morale when the operational phase is reached should be considered in earlier project phases.

Constantly evaluate employee morale when you are in the operational phase of a project.

It is less expensive and disruptive to maintain morale than it is to “fix” it, and to fix the resulting issues!

Lessons Learned

- **Criticality of listening to and communicating with the working troops**
  - Because the working level personnel had not been part of the solution, they had not bought in to changes in operation resulting from the shut-down
  - There was the feeling that because none of their suggestions appeared to get instituted, that no one cared what they thought
    - Because there was no feedback on the ideas, they thought they were being ignored, when in fact the ideas may have been considered or even implemented
  - Incorrect information was being propagated throughout the organization and taken as fact because of the lack of information flow
  - Visibility of NASA and contractor management personnel with an obvious interest in both listening and providing information opened up the lines of communication again

If you don't communicate with all levels of your project team regularly, someone else will! And you may not like the messages they communicate…

Listening to the ideas of your working troops goes a long way toward their job satisfaction, and ultimately the organizations' morale.

Lessons Learned

- **Teamwork between NASA and our Contractors**
  - Because of award fee implications, there is often some hesitation in letting government personnel get close enough to understand underlying organizational issues
    - Ideas for NASA employees
      - Make it personal – "I need you to help me fix this issue"
      - Make it clear that if the contractor fails, NASA fails
        - » No one wants to learn about issues for the sake of award fee considerations, they want to get the issues fixed!
      - Make contractor management aware you want to understand the issue and help fix it, but you do not want to "take over" (respect their rights as managers of the organization, even though you have responsibilities to the government)
      - Help get the resources they may need to fix the issue (it will be more sellable if the government and contractor are in lock step on the additional resources needed)
      - Make sure contractor management agrees, or at least understands your perspective, on the things that need to be fixed

Lessons Learned

- **Teamwork between NASA and our Contractors (continued)**
  - Ideas for Contractor management
    - Be open and honest with NASA on issues you've identified and how you want to fix them
    - Allow NASA to see the issues first hand without attempting to put your best foot forward

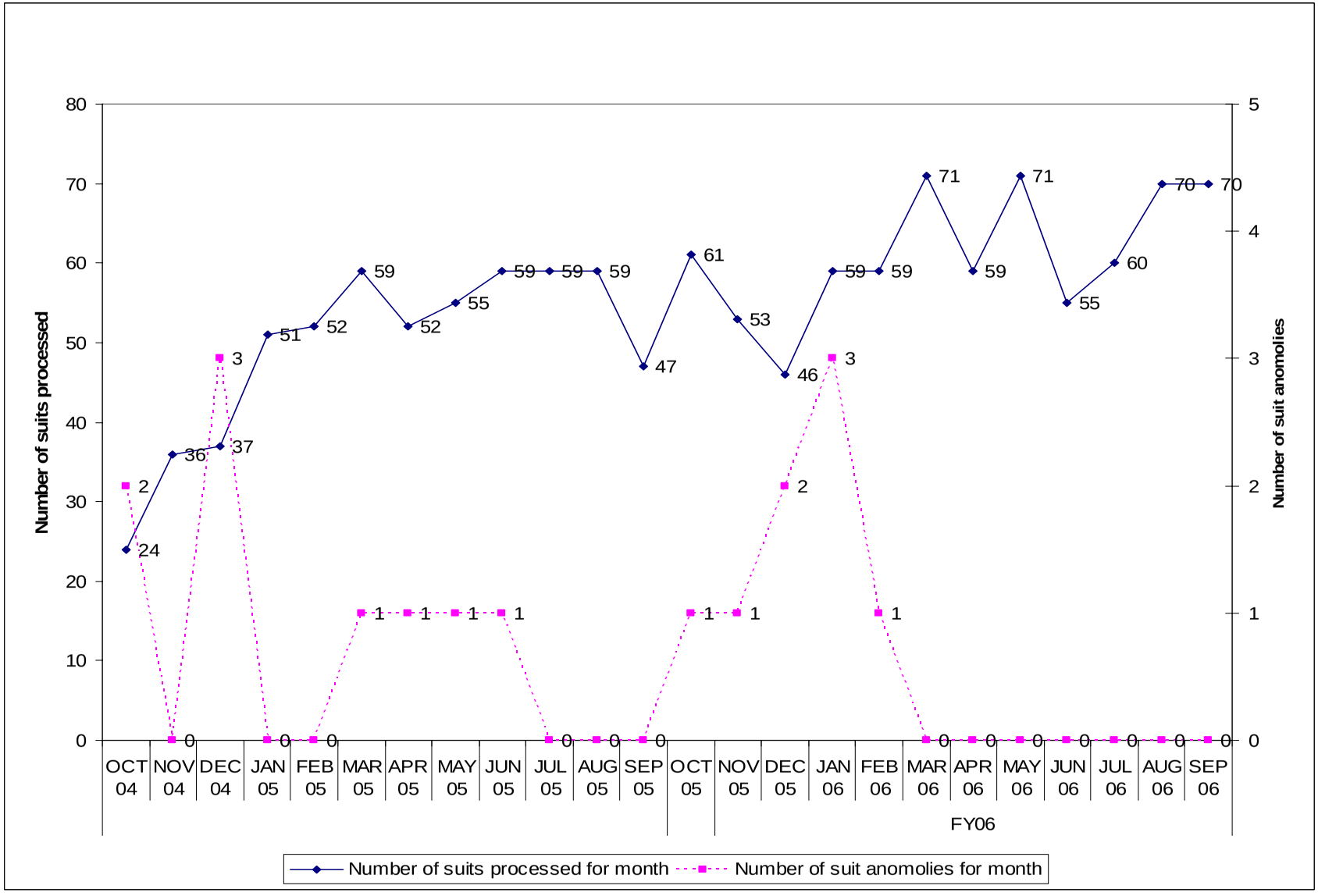
Everyone wants the same thing, and that is to fix the issue, so find a way to trust each other and work together!

Fixing the issue will have a much greater impact on award fee (positively) than NASA's awareness of the issues would have negatively.

Success Story!

- **So what happened to the NBL suit lab?**
  - Lines of communication between management and working troops reopened
  - Philosophy changes were implemented
  - Morale improved
  - Open communication between NASA and contractor occurred
  - **Success!**
  - **Continued teamwork to this day!**
- **The metrics speak for themselves**

Success!



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