

## **Tony Butina Video Interview Transcription**

### **Integrated Logistics Support—Start Early!**

I'd like to talk a little bit about some of the lessons that we learned early in this program. One being that we really didn't come on board until the CD phase. By that time, the design had solidified enough that any ability to influence it for maintenance and for repair was gone. You just couldn't do it that late in the design. The lesson being is that you need to be up there early in the program and considerate from the first time a piece of paper hits a pencil or you hit a key on a CAD drawing and it takes that engineer to have that in the back of his head as he designs it so that we can get to these things and get them repaired as fast as we can.

There is another story about how we were organized early in the beginning. No one ever had an ILS organization at this level and knew what to do with it. All of the logistics people were new and the NASA culture was different. When we first came on board, we were in the Operations Directorate. I don't understand the thinking behind that, but that's where they put us and we lived there for quite a while. Later in the program it was decided that we would go ahead and we moved over to the Engineering Directorate. By the time we were moved, the design had already been solidified. Again, there wasn't much we could do to influence for maintenance, but it was a good place to be. The recommendation would be is to have your logistics people in that design organization and in the engineering organization as early as you can so that they can do the things that they need to do so we could maintain the station more effectively.

While we couldn't influence design early in the program, one thing that did occur was Space Station is being built, I like to say, like a car that you deliver pieces one at a time and we give you a frame and you work with the frame for a while, then we give you some wheels and you work with that for a while. So you have this constantly evolving vehicle and you don't have all the redundancy and all of the spare parts that you need to maintain the final configuration. So through this building stage, we discovered that we really had some issues that if certain critical systems failed, which would be redundant in the end configuration were not redundant during the assembly, that we could have a real issue and might have to come home. So a team was formed between the logistics folks and between the flight controllers on how to get the right spares to orbit along with the assembly hardware so that we would be able to support this thing and not

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have it fall out of the sky. It was a great team effort that a lot of people worked and I think it helped the vehicle in a few places.

The lesson for exploration is you want to have the luxury of putting this thing together piece by piece and maybe flying it for a while in a certain configuration because you're going to want to fly it all at once. You need to really think up front and early what you're going to do and what you're going to need to take with you and how you ought to design it and build this. There's a lot of lessons to be learned about commonality, design and ease of maintenance that we didn't do because we didn't think we would have to do certain things and then we turned out and we did. So, you need to give a lot of thought on where your end operation is going to be and how you are going to get there.

Early on in the Space Station Program, there was very few logistics requirements and, without requirements, the logistics group at that time was having to act as advocates trying to persuade without having any real authority to go with it and so they had limited success at being able to influence the design in order to minimize the support footprint in the operations phase.

The logistics expertise was not brought onto the program until after the initial design concept phase was done and the major decisions had been made about the overall design of the space station, and so the influence that was left that could potentially be done was at a much lower level to where, in trying to influence the number of fasteners or the particular packaging of a particular piece of hardware, it was down at that level. What you would really like is for your logistics expertise to be a part of that design concept phase where, at the top level trades that are being made, that logistics expert can come in and say if you adopt these facets of an overall design you're looking at this type of life cycle cost. If you go with another set, your life cycle cost is going to look very different and giving those inputs back to the design team to help them make better design trades.

The message for exploration is, up front before anybody has actually done any drawings whatsoever, when you're in the design concept stage and developing that initial set of operational capabilities and the concepts that go with those, if you have logistics experts that you

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can bring in to develop a life cycle cost assessment to help write up front requirements that is the best opportunity to have the longest lasting and greatest impact on the ability to support that hardware once it's been developed and fielded at the lowest lifecycle cost.