

William Gerstenmaier Video Interview

Be Prepared for the Unexpected: Technical

The technical lesson learned was really the Columbia tragedy. We had really not been prepared for the loss of the shuttle. We kind of put together procedures in case a shuttle was lost or we lost an element, but we didn't really put all the details together and all the programmatic associated with that. So, when Columbia occurred it wasn't a Station flight. It was a non-Station flight. That Saturday morning, when I got the call at home that we had lost Columbia over Texas, it was really traumatic and our crew was ready to essentially come home on the next shuttle flight. I knew that shuttle flight probably was not going to occur. We had a progress vehicle in Russia that was about to go get ready to get launched at the time. We had to kind of stop everything. First of all, I came into the control center that Saturday morning. I called all the program managers from around the world. I explained to them what had happened with Columbia. I explained to them what we were going to do with Station and that our focus really was to focus on taking care of the crew that was on-orbit, the Expedition 6 crew, and make sure that they would be safe and we would figure out how we get them home and then after we figured out how do we get them home, what do we do with the next crew? We go launch and then how do we keep Station viable while we wait for Shuttle to return? So I kind of took the problem we had at hand. First talked to each one of the program managers, assured them what was going on, told them I needed help from them in the case of the progress vehicle. We stopped activities with the Russians for that launch. We went back and we surveyed all the components that were on that progress vehicle. We looked at what was on orbit. Was there anything unique we needed to add on that flight to make sure the crew could stay on-orbit? It turned out we didn't need to add anything. We didn't need to change the progress vehicle, but we stopped to make sure there was a chance to go do that. So, again, it was really hard because I was emotionally hurt by the loss of the crew and the loss of the shuttle vehicle. I didn't have much time for sympathy. I really had to get our team focused back on the Station and make sure that the crew on orbit was healthy and the Station was healthy moving forward. So that was a tremendous re-planning activity for us to go back and figure out how we wanted to continue to fly without the shuttle. We looked carefully at consumable on-orbit. The first problem we ran into was that, when shuttles came up the fuel cells generate water as a byproduct of generating electricity on the shuttle, so water was essentially for free from the shuttle. We didn't have any shuttles coming up for an indeterminate

William Gerstenmaier Video Interview

amount of time. There really wasn't enough water on orbit for the crews. Progress didn't have the capability to carry that much water to the crews. So we looked at what we could do from a crew maintenance standpoint and that was also a really hard discussion with our partners. The Russians were of the opinion that it would be good to just de-crew Space Station, stand-down for a while and then we would figure out, at the right time, to come back up with crew and continue to operate Station. The Russian motivation for that was that they thought by us standing down and removing crew that would put extra pressure on us collectively, both the US government and the Russian government, to support Station and we would then use that as a rallying point to get additional funding, potentially some more Soyuz, some more progress vehicles, expedite the recovery process on the shuttle. They thought that would be a positive motivator to keep us engaged in Space Station and my concern was if we removed the crew we kind of lost that emphasis to stay on orbit, to stay active with the Station and in fact we may get in a posture where decide maybe we don't want to continue on with assembly of Station, maybe it's too big a risk for us to continue moving forward once we remove crew. So my position was kind of the opposite of the Russians. My position was we wanted to keep the crew on-orbit if we could keep the crew on-orbit. Their position was bring them home. Our underlying rationale for both of those plans was the same. It was: how do we keep human presence in space? How do we keep exploring? How do we keep our crews active? How do we keep moving forward in the most expedient manner? And it was an interesting discussion with the Russians back and forth. Pretty strong debates early in the morning and the Russians said we're just going to bring our crews home and we're just going to de-crew Station and then I explained to them basically my logic was that I felt that if we stopped we would probably not start back again. At this point, the other European partners and Japanese modules were not on-orbit so Station was only partially assembled. We hadn't even met our international partner commitments. This would have been, I believe, a huge problem if we would have stopped and when I explained that to the Russians they understood my logic and said okay we'll work with you to go ahead and support keeping crews on orbit, but it was not an easy discussion. It was a true hard negotiation, but in the end, in hindsight, we kind of did the right thing and so at that point we knew we couldn't keep three crew on-orbit. We had to drop the crew size to two. So it came to Headquarters, or they actually came to Johnson Space Center, explained to them we were going to have to de-crew down to two crew members and then we would do our best effort to keep the crew on orbit. The way I looked

William Gerstenmaier Video Interview

at it was if we had to return the crew because we ran out of consumables, or a component broke that couldn't be repaired, as long as we could plan that ahead such that we could plan a normal reentry, it was no more risk to the crew. In other words, they were going to have to come home at the end of their expedition anyway and if we could predict ahead of time that we could do a routine planning, then, whether we ended a couple months early or we ended the expedition, it didn't matter from a risk standpoint. It was exactly the same risk. So I was able to normalize risk by putting a strategy in place where we carefully monitor consumables, we carefully looked at Station to make sure everything was exactly right and if something looked like it was going bad then we would start the plans to go ahead and de-crew Station and we could then do a normal return. So there was no guarantee I could keep a crew on orbit, but if the right hardware operated and the wrong things didn't break it would all work out. Also, at the same time, we quickly determined that this next expedition we would launch we didn't have enough water for them to stay on-orbit, even with the crew size of two. We got into a huge discussion with the Russians on how we're going to resupply water. They wanted us to pay it out of progress vehicles with water tanks and I was prohibited by the Iran, North Korea, Syria Non-Proliferation funding for that activity even though this was a fairly off-nominal situation. With loss of Columbia, I still could not fund the Russians. So we kind of went through this whole big period back and forth about what we were going to do with the crew and finally, in the end, the Russians determined it was in our collective best interest to go ahead and fly water up to Station. So they welded some water tanks into the progress vehicle, they flew them up on the progress and we were able to resupply the water and continue the crew throughout the period. So it was a tremendously tough time technically dealing with this day-to-day and then the uncertainty of when the shuttle would come back. The first estimates were shuttle will be back in six months and those six months went by and then it was another six months, and eventually it took over two years before the shuttle returned to flight. So we had to operate Station in a mode where we didn't know when the shuttles were going to return to flight. So we treated that kind of as an open-ended discussion. We did a different way of managing and so, instead of making decisions, it was more important when a decision had to be made as compared to what the actual decision was. So we would know at this point we needed to decide either to do A or B. So we would make a decision based on where we were, but we just kind of had a rolling timeline that went along. So we tracked consumables, we tracked deliveries. We tracked things and we just made decisions as they

William Gerstenmaier Video Interview

needed to be made because I had no certainty of when shuttle was going to be there. So that gave us a posture where we were stable, we could return the crew if we had to, from a safety standpoint, and Station was viable during that entire period. So it turned out to be a tremendously interesting way to manage with no idea what the future is. You talk about managing through uncertainty and unknowns. There was probably no larger uncertainty or unknown in this case. So we developed a scheme that allowed us to identify the critical decisions and the time those decisions needed to be made. We would make those decisions on that time with the data at hand and then let life play out and see if we made a good decision or not. So it was a very different framework moving forward. So, again, this is another situation where I had no idea we would lose the shuttle and, again, I think a lesson learned from that is be prepared, but also don't over prepare. We could have spent forever building contingency plans for loss of the shuttle, a detailed analysis of what we do if the shuttle doesn't return to flight, or it returns in three months, or all those contingency scenarios. That would have expended a tremendous amount of energy for us to go do that and we really didn't need to do that. We just needed that first steps that you need to do that we didn't do anything that got us into a posture where we weren't ready to go forward. The basic framework was there, but when the calamity, or the tragedy, of Columbia occurred we were able to figure out a way to move forward and still keep the focus on what we were doing, but we didn't over prepare and try to put all the specifics and all the details in place to work out all the "what if" scenarios because you could have never worked those out no matter how much resources you would have had. So the idea is to be prepared, but not be so overly prepared that you've expended extra resources in getting prepared. So in some ways it's like an athlete. You need to be at that right level of training that you're really ready to go execute the event. You don't know exactly how the event is going to come out, but you are really ready to deal with whatever comes your way and that's kind of the state you need to be in technical program management. You need to understand what those risks are, don't overwork them, but those first couple steps that give you enough time to go work the more details later. In the shuttle world, we have the pocket checklists. Those are the quick-look kind of things. So when a problem occurs on a shuttle, you pull out the orbit pocket checklist, or the ascent pocket checklist, or entry pocket checklist, and that gives you those first three steps that gets the vehicle basically stable; then that gives you a little bit of time then to go off and work the details, which are the more sophisticated analysis and whatever. So the trick here, or the thing in program

William Gerstenmaier Video Interview

management, is to have those first couple steps that you need to do in light of these calamities or tragedies and then you have that basic framework. You're stable then at that point that you're not going to be in a worsening situation and you've mitigated the damage at that point then you've got some time to re-plan and move forward, and we do kind of the same things when we do accident preparation, we do investigation board setup, etc. We had the basic team laid out. We do a couple sims so we're understanding what the basic first steps are, but then it's not worth it to take it down into the detail and carry all that paperwork with you and always be updating that paperwork back and forth. So, again, out of this whole big discussion you really have to be prepared for the unexpected, both programmatically when things are looking really good. Be ready that there's something out there. What have you not been doing? What things have you not looked at recently that you need to go back and look at? And then, technically, you need to be prepared for the really unexpected and you need not to have the details there, but just enough that you're stable to begin with.