

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Apply the Agency governance model with programmatic, technical and S&MA authority.	Ares 1-X Project Governance	Dan Mullane	The Mission Manager embraced the NASA governance model with a three-legged stool of authority: programmatic, technical and S&MA. All three authorities were part of all decisions.	Ares 1-X Clip: Safety and Mission Assurance	12
Articulate expectations - Orient partner organizations	Ares 1-X Project Management - Teambuilding	Jonathan Cruz	There was some culture shock once we arrived at Kennedy. It had been anticipated and they had actually held Kennedy 101 classes to try to educate other centers on what to expect	Ares 1-X Clip: Culture Shock!!	12
Avoid surprises by effectively coordinating and communicating ahead of time	Ares 1-X Communication	Bruce Askins	Communication was the key so when we came up on our major reviews there were very few surprises. It was not like you were overturning rocks at the meetings.	ARES 1-X: Clip: Communicate, Communicate, Communicate!!	12
Characterize testing facilities and plan with them ahead of time	Planning Test environments	Alvaro Rodreguez	Too often during the project we would run into scheduling, cost, or technical issues with a facility and then have to redirect our focus to another facility. If we had fully characterized our environments and defined our testing needs early many of these challenges would have been reduced or eliminated.	11934 – on orbit RCC repair – Verification planning: facilities	12
Clearly define roles and responsibilities and interface details between project phases	Ares 1-X Project Management - Articulating Roles & Responsibilities	Trip Healey	There are differing level of assumptions when determining roles and responsibilities once the hardware actually arrived at the launch site at Kennedy. Design engineers wanted to be involved all the way to the end, but the launch site folks were operating in a culture in which hardware is turned over to them. And there was a level of disconnect between the drawings and the task of assembly.	Ares 1-X Culture Shock!	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Codify your WBS early	WBS Process	Karen Lucht	So I would say early on understanding and codifying that WBS, whatever the architecture is you decide to use, by codifying that early, using that again, that starts to establish how you manage and report expectations to stakeholders, and then it allows you to help manage what they want later in terms of information, level of detail. By having that established early, you can use it as always again reiterating this is the level of detail we have, we established it earlier so we were able to leverage that and keep that consistency all the way through the closeout of the program.	Space Shuttle Transition and Retirement Lessons CLIP 9 Top Three Lessons Learned : Time Marker 0:46	12
Co-locate key people at the start of a project	Ares 1-X Project management - Co-location	Robert Ess	Co-locating some key people up front during the project formulation phase for 3 weeks to 2 months would have been good.	Ares 1-X Clip: The Importance of Co-location	12
Co-location is key to rapid development of system architecture	System Architecture Analysis - Project Management	Doug Stanley	Co-locate people if you want a group of people to accomplish something in a short time period.	ESAS Knowledge Nuggets ESAS Video; Time marker: 0:10	12
Consider advantages of a flat organizational structure	Ares 1-X Project Management - Organization	Robert Ess	Our organizational structure was as flat as you possibly could draw it. It made the lines of communication very clear. There was one control board. By structuring this way, our efficiency of communication, which is key to any project management, increased dramatically.	Ares 1-X Clip: Organizational Structure	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Consider how ARES 1-X lessons learned with limited management insight and oversight informs commercial space oversight activities	Ares 1-X Project Management - Oversight and Commercial Space	Doug Cooke	For the commercial cargo and crew plans, we can't be over intrusive into the process or the cost will blow up on us. We can apply ARES 1-X lessons learned in limited management insight and oversight, and in streamlining.	Ares 1-X Clip: Senior Leadership Part Three	12
Consider how Ares I-X lessons learned - and the culture battles - may be a precursor for the culture changes necessary to embrace commercial space	Ares 1-X Project Management - Oversight and Commercial Space	Dan Dumbacher	We can apply Ares I-X even to the commercial crew and commercial cargo operations. I think the culture question is the key in my mind and I'm honestly worried that we're not spending enough time really working through the culture of what needs to be done and what does not need to be done.	Ares 1-X Clip: Senior Leadership Part Two	12
Define clear organizational interfaces, roles and responsibilities up-front	Ares 1-X Project Management - Organization	Dan Dumbacher	When you're setting up a major project like this, spend a significant time up front on what the interfaces are, what the management scheme is, and what those relationships need to be. Minimize the interfaces, make sure that the management scheme and operation is clearly understood by everyone before you get too far down the road, and change the management scheme throughout the project life cycle, as needed.	Ares 1-X Clip: Senior Leadership Part Two	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Define your own playbook	Process Program Plan	Karen Lucht	So, in lieu of a playbook, develop your own playbook. Understand, again, once you know the scope, let's talk about what we have to accomplish, the timeline we have to accomplish it in, and let's develop the plays in order to get there, recognizing that it's adaptable as you go through there. So, you can't wait. That decision paralysis of waiting for decisions to be made, the playbook will enable you to actually move, make progress, good timely progress, and then adapt it as you go.	Space Shuttle Transition and Retirement Lessons CLIP 9 Top Three Lessons Learned : Time Marker 2:32	12
Delegate budget and schedule authority to lower-level project teams	Ares 1-X Project Management - Organization	Jeff Campbell	Each IPT had their own budget and schedule authority, and that seemed to make things run smoothly.	Ares 1-X Clip: Organizational Structure	12
Develop a Program culture that transcends Center-to-Center cultural differences	Ares 1-X Project Management - Teambuilding	Marshall Smith	A center-focused mindset needs to be shed, and you're going to have to come with a system mindset, a system set of organizational goals and standards that you're going to follow as a system, regardless sometimes of your center's wants and needs.	Ares 1-X Clip: Culture Shock!!	12
Develop, document, and communicate the project governance model	Ares 1-X Project Governance	Robert Ess	We at NASA tend to delegate responsibility and retain authority. I was delegated both. This worked well. People are smart and will figure out who the real decision maker is, and they'll concentrate their energies there. We relied on the NASA governance model (technical authority appeal route), which helped.	ARES 1-X Clip: Communicate, Communicate, Communicate!!	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Document and communicate assumptions embedded in trade analyses	System Architecture Analysis - Modeling and Analysis	Doug Stanley	Document your assumptions, so that you can do proper analysis and trade studies.	ESAS Video; Time marker: 5:00	12
Drive to closure	Retiring tasks early buy schedule	Wayne Hale	You need to drive things to closure faster and that will pay off later. You need that time. And I learned that in this mission and there were people already on the mission who knew this— I had people pressuring me that we need to close this trade	KBR -11397 Project Lessons Learned	12
Early in the project engage technical authorities at HQ and Centers and establish mutual expectations	Ares 1-X Working with Technical Authorities	Jon Cowart	The core team gets that better is the enemy the good enough, but the people back at the centers who aren't involved with us day to day, they're very worried, they see us, in their opinion, short-circuiting process and not following all the guidelines and all the standards and requirements.	Ares 1-X Clip: Better is the Enemy of Good Enough	12
Ensure balance between risk acceptance, staffing and budget.	Systems architecture	Mark Krome	MSFC, being a manned space flight center we have a high emphasis on reliability, on safety, on system redundancy and an important aspect of that is to verify that you've met system requirements. On DART, however, there were some initial differences in terms of the project expectations for how this would be done, among the things that would make it a high risk project, were the fact that it was to be largely single string, it was to be low cost.	DART Video Case Study: Page 21, Section: Risk Posture and Verification P2 Time 0:27	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Ensure that adequate staffing is in	Organizational Priority	Chris Calfee	DART was proposed as low risk—I'm sorry—high risk, low cost project, so that theme was carried over to the government side as well. So we started. I had no business office. I had no business manager. I had some support but no dedication there. No schedule, scheduler; I had schedule support, but not day-to-day.	Demonstration of Autonomous Rendezvous Technology (DART) Video Case Study: Page 8. Time: 3:31 Dart Overview	12
Establish a baseline and track multiple performance metrics	System Architecture Analysis	Jay Falker	Use the technique of having multiple performance metrics to make decisions. EMSD should establish a baseline and then fully understand the impact any change has across all elements and aspects (cost, schedule, risk, performance).	ESAS Video; Time marker: 21:45	12
Establish a clear, streamlined project governance board structure	Ares 1-X Preproject Governance	Chris Calfee	The systems requirements were controlled by the MMO but so was the next level of documents, the elements requirements documents. These latter documents were also contractually controlled documents so two boards were controlling this 2nd set of documents. Avoid that.	Ares 1-X Clip They are Guidelines, not Requirements	12
Establish S&MA requirements up-front	Ares 1-X SMA Technical Authority	Robert Ess	We were late getting the S&MA requirements for this flight test. People used 2 approaches: take the Shuttle requirements and cross off what doesn't apply, or start with a clean sheet and define what is needed. We spent days trying to marry those two approaches.	Ares 1-X Clip They are Guidelines, not Requirements	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Evaluate the applicability of ARES I-X streamlining and management approaches	Ares 1-X Project Management - Oversight and Commercial Space	Doug Cooke	ARES 1-X helps us to understand where we can streamline activities without sacrificing success.	Ares 1-X Clip: Senior Leadership Part Three	12
Expand QD limitations with a maximum credible event approach	Hazardous material storageOvercoming manufacturing limitations and logistics issues	Steve Stover	Limitations of the VAB regarding the amount of allowed hazardous materials and the associated quantitative distance limitations were going to cause assembly and scheduling issues for programs after the shuttle. Using an approach previously developed by the DoD called Maximum Credible Event (MCE), a revised hazardous materials limit was determined for the VAB that could accommodate requirements for future launch vehicles.	2589 Quantity Distance Limitations	12
Finalize SMA requirements before awarding any contracts	Ares 1-X Safety and Risk Management	Dan Mullane	Do not award contracts before you have the right set of S&MA requirements. This was an afterthought in ARES 1-X.	Ares 1-X Clip: Safety and Mission Assurance	12
Focus on managing the details of the program execution	System Architecture Analysis - Project Management	Bill Claybaugh	Is well-organized system engineering needed? Anything (i.e. any management/process approach) can be made to work. The details are in the execution, not in the theory of management.	ESAS Video; Time marker: 12:00	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Have a discussion up-front with all stakeholders to baseline the risk management and technical authority oversight approach	Ares 1-X Project Management - Oversight and Commercial Space	Doug Cooke	If we're satisfied with less insight or oversight for commercial entities then you have to ask yourself why isn't that good enough for the government developed vehicle. That's a big area of discussion. We have to have good models for implementing this. We have to concentrate on the high risk areas only, stop asking the "what if" questions as engineers, have management discipline, and education for everyone on the new way of operating. This is a culture change.	Ares 1-X Clip: Senior Leadership Part Three	12
Identify long lead items early, including supporting test and launch hardware	Long lead materials Scheduling	Larry Schultz	It is critical for the program to identify all the long lead items early. In this case umbilical plate assemblies were not acquired early enough in the program to support the test and integration schedules. Each team needs to be able to raise awareness within the program of their long lead items early on. Had the issues been raised early the funding would have been available and the time to negotiate acceptable delivery dates for the hardware would have been adequate.	4133 Umbilical Plate Assembly Deliveries	12
Maintain a top-level, integrated understanding of risk	System Architecture Analysis - Risk Management	Joe Fragola	Program managers should have a version of this integrated tool that integrates risks, costs and performance, to keep the engineers honest, since they may be driven by local optimization without considering global optimization.	ESAS Video; Time marker: 19:15	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Recognize communication challenges early-on and implement robust processes to address	Ares 1-X Communication	Ed Mango	Start early, get the team down, understand the issues with the team, understand how the team communicates and treat it like a team, not as a number of individuals. Badge-less is definitely the way to go.	ARES 1-X Clip: Communicate, Communicate, Communicate!	12
Recognize that hybrid, "one-shot" test projects may not need standardized rules	Ares 1-X Project Management - Requirements Management	Dan Mullane	Since ARES 1-X was a one-shot un-crewed flight, we made the maximum use of existing processes, allowing for maximum flexibility versus standardization between project segments. This puts the burden on the folks that had to do the integration function, but I think it was the right approach.	Ares 1-X Clip: Safety and Mission Assurance	12
Seek ways to innovate in how we accomplish space missions while managing risk	Ares 1-X	Dan Dumbacher	Most of our work force has been hired since Challenger and Columbia when, from a human space flight perspective, we got much more risk adverse. We have to help bring them along from that risk averse posture into a posture that's willing to take a little bit more risk. We'll make some mistakes along the way, but I think we can find ways to operate more efficiently and ARES I-X gives us that big key data point to start the conversation.	Ares 1-X Clip:: Senior Leadership Part Two	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Set realistic schedules	Schedule, requirements determination, program set up	Mike Fowler	instead of putting a more realistic schedule for the first return to flight, we were always pushing the flight back about three months from the previous date. So every time that it got pushed back three months, we were back in that same situation of still not being able to change the hardware, still not being able to change the material, and it was just an endless loop of not being able to change anything and being stuck with a design that really didn't make sense from the initial requirements that were setup.	KBR 11938 Clip: Context; Lessons Learned -Schedule - Time marker: 0:00	12
Start project elements on time, even if it is not perfect. Start finding problems early on	Ares 1-X Schedule-driven, risk informed Project Management	Robert Ess	Start when you have to start, schedule-wise, even if it is not perfect. Don't worry about it. The 80% solution is good enough. That way you will find your problems early and stay on track.	Ares 1-X Clip: Schedule Management	12
Structure your risk program to your needs	Risk Management Structure	Jonathan Krezel	The challenge with a risk management system is how far do you take it? You always need one. It's simply a matter of the details of what kind you want to set up. So I think in guess the lesson learned, my take away from that, is acknowledge that you should handle risks whenever you start a new activity like retirement and give some thought as to what that risk management system should look like for you. The answer is you need some sort of system to manage risks. The issue is just what kind of details you're going to use to set it up, but make sure you think deeply about it.	Space Shuttle Transition and Retirement Lessons CLIP 6 Top Transition and Retirement Risks: Time Marker 3:13	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Tailor 7120 to your project needs and make sure senior management supports it	Ares 1-X Project Management - Requirements Management	Marshall Smith	Some people think that 7120 is something that actually holds you down, but it is extremely tailorable and people need to do that. Senior management needs to let go of their favorite requirement when it is not related to the mission goal. So, tailoring is a big thing that needs to be recognized and needs to be used and allowed to be used.	Ares 1-X Clip: Systems Engineering and Integration	12
Use an integrated risk management approach in assessing architectural options	System Architecture Analysis - Risk Management	Joe Fragola	You need an integrated risk management and mitigation approach, so that risk reduction in one segment doesn't increase the risk elsewhere and possibly to the overall architecture risk. Don't have pockets of risk mitigation in isolation. A integrated approach, using one tool with risk, cost and performance included is important.	ESAS Video; Time marker: 4:00	12
Video-capture critical " know-how"	System Architecture Analysis - Knowledge Capture	Bill Claybaugh	Rockedyne recorded the know-how about the Saturn 5 by video-taping every single person who had worked on the F1 engine, talking about every detail of what they did. The know-how had all been documented and was available. And that is how you do it.	ESAS Video; Time marker: 31:00	12
When necessary employ engineering judgement - informed intuition in considering options	System Architecture Analysis - Decision Making	Doug Stanley	Work with good models but also with informed intuition based on experience, since in space exploration we don't have vast amounts of empirical data. We need intelligent drivers/architects using these tools.	ESAS Video; Time marker: 26:45	12

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Apply the mantra that better is the enemy of good enough on a test project	Ares 1-X Design test and analysis	Robert Ess	If you can do another analysis or if you can do another test, we typically try and do that. That's our culture. But for a flight test and its okay if there's a possibility that it won't work, so better is the enemy of good enough really was the mantra that we tried to instill upon the managers and the lower level managers	Ares 1-X Clip: Better is the Enemy of Good Enough	22
Assess organizational leadership and staffing risk as well as technical, cost, and schedule	SLWT Project - Risk Management	Bryan O'Conner	There is a lot of risk talk you can do on the technical matters and on the performance versus safety, but the organizational approach is equally important. There is a human side to this. Is this going to be too much for this project manager to handle? Does this project manager have access to the right support from his host center.	Super Lightweight Tank (SLWT) Case Study Exercise 1: Risk Identification; video clip/transcript	22
Balance the right amount of analysis and testing to verify a design	Design and Requirement verification	Ben Greene	Too much time was spent trying to analyze one of the design options when in fact it was easy to test. Testing ended up being the method we used to verify the design option as viable but we spent a lot of extra time and resources on analysis that wasn't necessary in the beginning.	11934 – on orbit RCC repair – Verification planning: analysis vs testing	22
Build-in budget reserves	SLWT Project - Project management	Parker Counts	We had a development budget of about \$132 million. We were able to complete the project and still have \$20 million in reserve.	SLWT Exercise 6: S&MA Risk Mitigation Planning; video clip/transcript	22
Centralize the SE&I function and give it a project-wide scope	Ares 1-X Project Management - Organization	Marshall Smith	We reformulated the project after one year and put SE&I in a single place with more of a project focus rather than a vehicle or ground focus. This helped the project along.	Ares 1-X Clip: Systems Engineering and Integration	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Conduct an integrated logistics support analysis	Design / Logistics / Reliability	William Robbins -Anthony Butina	LSA, Logistics Supportability Analysis, is a body of activities aimed at identifying what the resources are going to be needed in order to support the hardware as well as identifying the basics of crew operator tasks, how to do it, the parts that will be needed, the tools that will be needed	ISS Video Dashboard William Robbins Clip 3 also Anthony Butina Clip 3	22
Consider advantages of a flat organization in DDT&E activities	Ares 1-X Project Management - Organization	Jeff Hanley	Whenever you have a vertically oriented organization with many levels to it, there's a tax you pay in what would be a fixed cost that is going to stay with you. A flat organization avoids those costs.	Ares 1-X Clip: Senior Leadership Part One	22
Consider commercial off the shelf equipment for cost effective short lead time parts	Cost savings	Ben Greene	As the requirements were defined more, we realized that we could actually use commercial off-the-shelf equipment as the dispensing mechanism. At first it made the engineers uncomfortable since they are not part of the development of the hardware but in the end it was a cost effective and inexpensive way of accomplishing the task.	11934 – on orbit RCC repair – COTS Hardware	22
Consider concurrent engineering when facing a compressed schedule project	Ares 1-X Design, Development, Test & Integtaion	Ron Unger	Build a mindset early on within the project team that given the compressed schedule, we are going to do concurrent engineering (requirements development, design, fabrication, stacking, testing).	Ares 1-X Clip: Schedule Management	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Consider the trade-off between reliability, maintenance, and supportability	Design / Logistics / Reliability / Operations	William Robbins	The more reliable the hardware is, the less resources you would need in order to maintain the hardware. There's a cost tradeoff with that in the design phase in that in trying to make the hardware more reliable you're increasing cost during the design and development phase with the expectation that you'll be able to reduce support costs	ISS Video Dashboard William Robbins Clip 5	22
Consider ways in which ARES I-X project demonstrated new approaches for hardware development	Ares 1-X Project Management - Organization	Dan Dumbacher	One of the big reasons for doing Ares I-X was to be able to get a development flight test off, get some data into the design process quickly, but it also had the secondary benefit of demonstrating to a large part of our work force that not everything had to be operated like shuttle, like a human space-flight program.	Ares 1-X Clip: Senior Leadership Part Two	22
Control cost by managing the schedule	Ares 1-X Project Management tools	John Howell	Schedule is money. Provide training to technical managers to understand that and give them the tools to manage cost and schedule.	Ares 1-X Clip: Business Operations	22
Defend against requirements creep	SLWT Project - Project Management - requirements management	Brewster Shaw	Requirements management, baseline configuration management, are extremely important. Requirements creep is a living thing in our programs and if you don't keep it under control, it'll ruin your program.	SLWT Exercise 4: Design Verification Risks; video clip/transcript	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Design for maintainability - 100 screws! Are you kidding	Design / Logistics / Reliability / Operations	Anthony Butina	So there's a treadmill and that treadmill base has 100 screws around it in order to get to a motor that is embedded inside. The time it takes for a crew member to get 100 screws off to get into that is overkill. You just don't need to have that. .... that three pound motor took a couple of hours to replace, not just because of the screws, but how it was embedded inside of that treadmill.	Anthony Butina Clip 4	22
Design for storage and trash management	Design / Logistics / Reliability / Operations	William Robbins	You have to have a detailed operational concept that considers, not only everything that is coming up that the crew is using, but what is the crew going to be using. How much consumables are there? What volume do the consumables take up? And, do those trades of onboard stowage and transportation options	ISS Video Dashboard William Robbins Clip 4	22
Discover and expose undocumented assumptions	People / Communication / Operations	Mark Geyer	So I think how that how you apply that to things like testing and even analysis is that we need to be real clear on assumptions, on input variables, for example on loads, and even on factors of safety, on conservatism, because we definitely come at that in different ways. We each have our own biases about what we have experienced in the past. It is important to penetrate to that next level to ensure that you are integrated—whether it is an integrated analysis or an integrated test—that there aren't hidden things or gap	ISS Video Dashboard Mark Geyer Clip 4 (all - esp 5:30 - end)	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Divide productions teams from enhancement teams	Organizing by project phase	Parker Counts	It was ideal to separate the production team (which was allowed to focus on supplying the LWT for continuing SSP operations) from the development team (which could then concentrate on SLWT) under one ET Project Manager, so that each team was not competing for the same resources	SLWT Clip: Lessons Learned (4 of 4)	22
Employ multiple, mutually supportive risk management approaches	Ares 1-X Safety and Risk Management	Dan Mullane	We used the risk management system, in addition to the fault trees, hazards and FMEA/CILS for risks for which it is not clear yet how we will manage them. We can't write things in a hazard report that are not defined yet.	Ares 1-X Clip: Safety and Mission Assurance	22
Empower rapid prototype development team management	Ares 1-X Project Management - Organization	Jeff Hanley	It became pretty clear that we needed to establish a truly independent team and that I needed to give them the freedom to move as rapidly as they possibly could. In other words, putting Bob Ess in the leadership position and empowering him to make decisions at his level without a tremendous amount of care and feeding, if you will, of the main line program.	Ares 1-X Clip: Senior Leadership Part One	22
Empower the SE&I function with overall budget and schedule authority	Ares 1-X Project Management - Organization	Jeff Campbell	We had a flat org structure and delegation to the IPTs, you have to have a strong SE&I function up front, and this function needs to have the authority to maintain the overall project schedule and budget, what in a traditional program is called level 2.	Ares 1-X Clip: Organizational Structure	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Empower the SE&I managers to manage	Ares 1-X Project Management - Organization	Robert Ess	A flat org chart becomes wide, and you have to deal with many interfaces. SE&I managed those interfaces, not as integrators, facilitators or coordinators, but as empowered managers. Don't just make them book managers. These are mini-project managers.	Ares 1-X Clip: Organizational Structure	22
Engineer upfront	Peer review disposition of risk	Jim Snooddy	DART ended up with 300 plus related to critical design review, ended up with six components that were failed and ended up in a band aid approach of trying to do system engineering so you spent all your time on DART trying to fix all the system engineering adequacies and you really didn't have time to think about the broader context and actually trying to figure out how to make it better, it was more one band aid after another	DART Video Case Study: Section: Risk Posture and Verification P2 0:00	22
Ensure adequate staffing and increase as necessary with changes in baseline	Organizational Priority	Chris Calfee	push back a little bit more early-on.. I was told, or directed, that I was to have a fixed amount of project office personal, and it was four.	DART Video Case Study: Page 20 Section: Other constraints Time 0:51	22
Establish and maintain a documented, controlled project baseline	SLWT Project - Project management	Brewster Shaw	I highly recommend that we have an equivalent to 07700 to tell you how to execute the program and it talks about risk management specifically, having that to fall back on was an excellent way to manage a big, complex, high-risk program like Space Shuttle	SLWT Exercise 4: Design Verification Risks; video clip/transcript	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Establish reasonable milestones that will support adequate testing	Schedule pressures and reasonable targets	Chris Calfee	Schedule pressure is going to be a part of every project that we do at NASA. It's been a part of every project I've ever worked on, and I expect it will be a part of every project I ever work on at NASA. There was one difference for DART: we had a target spacecraft called Mobilecom. It was a retired Department of Defense satellite that was basically given to Orbital. It had completed its mission; it obviously had a limited life. The original target launch date was April 2004. That had slipped a little bit, we were in the fall of 2004, and we were worried about Mobilecom even being there.	DART Video Case Study: Page 19 TIME 0:00 Schedule Section	22
Expect rapid prototype development to place schedule first	Ares 1-X Project Management - Schedule	Jeff Hanley	A lean team that is focused on staying on schedule needs to make decisions to moving. You can't dither and get into analysis paralysis. It means that the senior leaders on the team need to make tough choices and they're not going to have a warm tummy feeling with every choice that they make.	Ares 1-X Clip: Senior Leadership Part One	22
Fly as fast as you can	DD&T / Design / Test / Risk Management / People	Mark Geyer	So you make a choice: fly something early, it's not the perfect design yet but you're going to learn a ton about the design and you're going to be able to focus the team, you're going to actually learn a bunch about how to not just the design but about the processes, processes, and even the contract and everything else and it shows that you're moving forward	ISS Video Dashboard Mark Geyer Clip 6 (all)	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Fully Qualify Large Mechanical Systems	Verification	David McCann	for a large complex mechanical system like this you've got to perform a major qualification of the hardware; test as you fly. SARJ was originally designed to be tested that way; over the years as the program developed and cost constraints came along the determination was we would perform proto-flight testing of the two SARJs and that there wouldn't be a major qualification test performed on the SARJ.	KBR - 11825 Solar Alpha Rotary Joint (SARJ) Vibrations Pose Risk to ISS Power and Operations	22
Go back and review risks and assess how risks may have changed with time	Risk Management / ECLSS	Kirk Shireman	The key is continually going back and looking at those risks, even the ones that are not your number one risk to see if did I understand them correctly, have they grown over time, is our understanding of those changed, has other factors in the environment changed that would change my overall risk assessment, and where I would deploy my resources?	ISS Video DashboardShiremanClip 3, 44:40 - end	22
Implement a "Lean" approach to rapid early development flight test activities	Ares 1-X Project Management - Organization	Jeff Hanley	We understood that we needed to really be successful with I-X, we needed to stand up a leaner, small team, much smaller than the full program team to really work in parallel so that we could really make this early flight test happen, but yet not have it sideline or derail the main line activity of formulating Ares I and Orion.	Ares 1-X Clip: Senior Leadership Part One	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Implement commonality to reduce spare inventory (mass and volume)	Design / Commonality / Logistics	William Robbins	Commonality can be a big payoff, but it's very difficult to get a design team or a project to accept commonality requirements because they feel that it restricts their designer's ability to be innovative and they've got a point, but the payoff with commonality is that if you have common fixtures, common fasteners, common connectors, common parts, you reduce your support resources	ISS Video Dashboard William Robbins Clip 7	22
Implement rigorous risk management and quality assurance processes	Ares 1-X Safety and Risk Management	Dan Mullane	I always go back to two basic areas—you have to make sure you have a strong analytical function to make sure that you are being very systematic in identifying sources of risk. The other function that I think you have to have is a very good quality assurance program to make sure that all of the analyses that you are doing are valid because the hardware that we are going to fly is actually the same as the design that you analyze. And whenever it's not, make sure it's understood and get a proper engineering assessment.	Ares 1-X Clip: Safety and Mission Assurance	22
Incorporate design engineering in launch-site integration	Ares 1-X Project management - Co-location	Vince Bilardo	From an engineering perspective, there is just no shortcut for having a presence at the launch site, being close to the hardware and having the ability to inspect it with your very own eyes and with the team, the stakeholders who are involved in trying to resolve that issue	Ares 1-X: Clip: The Importance of Co-location	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Limit the amount of contract change activity	Contract changes effecting Program overall objectives	Chris Calfee	The proposed cost for the DART project—and Orbital Sciences was the prime contractor—was approximately 50 million. Half of that cost was for the launch services, and that was essentially a fixed cost for the Pegasus launch vehicle. The other 25 million was for the design, development, test of the spacecraft itself which had the key sensors to provide the navigational technology to get to Mobilecom, which was our target spacecraft. At the end of the day, the total cost of the DART project ended up about 110 million, and there were various reasons why we ended up there.	DART Video Case Study: Page 18. 0:00 Cost Section	22
Locate the reliability, maintenance, and logistics function within the design organization	Design / Logistics / Reliability	Anthony Butina and William Robbins	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.	ISS Video Dashboard Anthony Butina Clip 2	22
Maintain contractual responsibility, even though you operate as a badge-less team.	Ares 1-X Contract Management	Ron Unger	It's nice to all say you're going to throw your badges on the table when you walk in and you're all one big happy family, but you still have to maintain that level of contractual responsibility as well	Ares 1-X Clip: Roles and Responsibilities	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Make no compromises on integrated test and verification	Ares 1-X Safety and Risk Management	Dan Mullane	Towards the end there was some pressure to forego some verification activities in order to keep the launch date. We had some spirited discussions. We ended up completing all verifications without slipping the launch date. This meant that many folks worked long hours. We got the job done and I think that helped pave the way to success.	Ares 1-X Clip: Safety and Mission Assurance	22
Manage scope and requirements creep.	Ares 1-X Project Management	Vince Bilardo	Two-thirds of our cost growth was driven externally by the increase in scope and the creep in requirements. It's not easy and it takes a lot of very disciplined and focused attentive work and appropriate systems and processes to very carefully define your configuration and then to hold it.	Ares 1-X Clip: Plan Then Do	22
Manage to schedule when schedule is "King"	Ares 1-X Schedule-driven, risk informed Project Management	Robert Ess	We made decisions to stay on schedule. After a while that's infectious and people realize that we're doing this. It not when we get around to it or when the analysis is done, but it's like, we're really doing this.	Ares 1-X Clip: Schedule Management	22
Match as-built to drawing Configuration	Reduce mismatched parts with current drawings	Ed Statham	it is really important that you maintain an as-built database that is accurate, and that your as-designed be verified against the as-built, and probably released via a change order before you actually incorporate it into the new design.	KBR 5048Clip: Identification of RiskTime marker: 04:11	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Minimize your number of control boards	Ares 1-X Project Management - Organization	Robert Ess	We decided to operate with one control board for most of the project, since most of the same people would be at any subordinate boards anyway. At the end we only created subordinate boards for instrumentation and floor processing to handle day-to-day near real time decision making.	Ares 1-X Clip: Organizational Structure	22
Move toward paperless processing of hardware.	Ares 1-X Project Management tools	Jeff Campbell	Paperless processing of hardware provides for a quicker way to change, close out and process control procedures.	Ares 1-X Clip: Information Technology	22
Plan and manage, to the extent possible, with margin	SLWT Project - Project management	Parker Counts	We set an internal goal of 8,000 pounds – so we were striving to do 8,000. Now we succeeded with 7,500 plus; but at least we started with some margins, so we had some ability to redirect in some areas.	SLWT Exercise 6: S&MA Risk Mitigation Planning; video clip/transcript	22
Prevent assembly operations surprises	Verification of as designed to as-built prior to new engineering	Ed Statham	By closely maintaining your as-built configuration, and by checking your as-designed against that as-built configuration before you include the new engineering into the planning, you will avoid unnecessary surprises, schedule delays, and cost, by understanding completely what is required to go do a job prior to beginning.	KBR 5048Clip: Mitigation of Risk Time marker: 01:47	22
Recognize that NASA Standards are guidelines - tailor them appropriately for a given project	Ares 1-X Requirements Management	Jon Cowart	All those NASA standards out there, they are guidelines. If they don't make sense, talk about them and agree to not do them. I don't care what size your project is, don't feel like you have to follow those rules/standards. Be smart.	Ares 1-X Clip They are Guidelines, not Requirements	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Recognize that project organizational structure should be re-evaluated at each life-cycle phase.	Ares 1-X Project Management - Organization	Jeff Hanley	One of the conversations senior management should have with the project manager and program manager and that the program manager should have with his project managers and so forth is whether we organized properly for the next phase? E.g., design integration in phase B is very different in nature than conceptual work in early phase A.	Ares 1-X Clip: Senior Leadership Part One	22
Recognize the advantages of rapid prototype development to complement traditional human space flight DDT&E	Ares 1-X Project Management - Organization	Jeff Hanley	A development program can go down two paths What we've been used to in human space flight is a path of doing rigorous ground testing before we commit to a flight test, and that is the way much of the Constellation plan had been formulated. What Ares I-X showed us is that there is another strategic path of incremental flight testing, or incremental build-up in capability through flight testing as an alternative means to reach certification.	Ares 1-X Clip: Senior Leadership Part One	22
Reduce cost with commonality	Use aerospace or commercial standards to limit cost	Warren Woodworth	One thing that drives cost is having a unique design, having unique hardware, unique specifications, multiple specifications, unique materials... All this drives cost and it drives schedule, so the thing to strive for is commonality.	KBR 5046 CommonalityClip: Identificaiton of RiskTime marker: 0:11	22
Secure dual suppliers for critical elements/material	SLWT Project - Supply Chain management	N/A; Report	Reynolds Aluminum was the sole supplier of Al-Li 2195 but was not the original inventor, and initially was not able to reproduce the material. The project qualified Alcoa as another qualified supplier of Al-Li 2195	SLWT Lessons Learned (3 of 4); PPT	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

<b>Tagline</b>	<b>Theme &amp; Tags</b>	<b>Presenter</b>	<b>Abstract</b>	<b>Find It Here</b>	<b>Index</b>
Select common electronic tools (Requirements, RM, CM, EVM, schedule)	Ares 1-X Project Management tools	Bruce Askins	Carefully select the proper configuration management tool and include some good training for everyone upfront.	Ares 1-X Clip: Information Technology	22
Select one schedule tool and make sure everyone is using it	Ares 1-X Project Management tools	John Howell	On this project the schedule was king. Take time initially to pick a good scheduling tool and mandate that everyone use it. We used Primavera.	Ares 1-X Clip: Business Operations	22
Set a verification baseline in line with risk posture early on	Systems Engineering Design Verification	Jim Snoodly	In the beginning the verification approach was using a very similarity approach very heavily weighed toward similarity and analysis with not a full recognition of in space environments, a launch vehicle and the complication of the technology being very low with very little hardware in the loop, system-type test, so as we evolved out of the CDR	DART Video Case Study: Page 21, Section Risk Posture and Verification Approach Time: 1:37	22
Set up regular communication channels between design teams	Dispositioning all nonconformances	Jim Lomas	The second problem that the SURI had was an embedded velocity bias which was documented by the company, but not very well communicated between the various design teams.	DART Video Case Study: Page 32, Section: Rendez 0:48	22
Stay on schedule by making timely risk-informed decisions	Ares 1-X Schedule-driven, risk informed Project Management	Jon Cowart	When we were "not ready" for a decision that had to be made to stay on schedule, we would talk about the situation very openly so that we could identify the real problems and the project manager can make a risk-informed decision.	Ares 1-X Clip: Schedule Management	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Tailor risk management processes consistent with a flight test project	Ares 1-X Risk Management	Bruce Askins	As far as actual risk for our project, we kept the scoring approach the same as regular programs. So a lot of our risk ended up scoring higher than what you probably would expect for just a test, project.	Ares 1-X Clip: Better is the Enemy of Good Enough	22
Take no shortcuts in development testing	SLWT Project - Verification testing	Mike Pessin	When you start a program, you need to do your due diligence and understand what you're getting into - do the the advanced technology development. Give the people the right test hardware, give them a chance to do the proper testing. If you try and do that on a shoe string, it's going to come back and bite you!	SLWT Exercise 2: Materials - Risk Mitigator; video clip/transcript	22
Test Like you fly	Systems Engineering Design Verification	Jim Lomas	The SURI GPS receiver when it got on orbit for the first time in the DART mission it saw more satellites than it had ever seen before in any terrestrial application or any testing. The software inside the SURI didn't really know how to handle this very well and it caused a slight hiccup in the navigation state that the SURI was putting out. This caused a navigation state error which was the original cause for the filter, the GN&C navigation filter to reset. When that happens we take the solution from the SURI and use it as a starting point and then start trying to navigate	DART Video Case Study: Page 32, Section: Rendez 0:08	22
Test, Test, and Test	Design / ECLSS	Robyn Gatens	we learned things on orbit that maybe if we had tested more on the ground we would of uncovered on the ground. So test, test, test – I know I'm not the only one that ever says that.	ISS Video Dashboard Robyn Gatens Clip 8	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Unburden your configuration management	Use of non critical parts should be tracked wisely	Ed Statham	be smart about what you choose to track in your configuration management system. Track the things that are important to track, but don't track things that are not critical and otherwise don't require tracking.	KBR 5049 Cumbersome Pedigree Maintenance Clip: Mitigation of Risk Time marker: 02:38	22
Use Common Specifications	Commonality reduces the potential for error	Warren Woodworth	There is potential for process escapes or process errors, using one application in the wrong situations, in other words using a specification for one vendor and an application for another vendor, so it promotes the opportunity for errors. Commonality will eliminate a lot of that.	KBR 5046 Commonality (Identification of Risk) Time marker: 02:00	22
Use top-down and bottoms-up risk identification methods.	Ares 1-X Safety and Risk Management	Dan Mullane	Our systematic identifying of safety and mission success risks consisted of a top-down fault tree analysis and a bottoms-up FMEA/CIL study. That worked well.	Ares 1-X Clip: Safety and Mission Assurance	22
Utilize available "Lean" training to prepare rapid development teams	Ares 1-X Project Management - Organization	Jeff Hanley	I had asked the, at the time, deputy project manager for Ares, Dan Dumbacher, to do a lean event, if you will, a lean six sigma activity, to look at how we were working together to make Ares I-X happen.	Ares 1-X Clip:: Senior Leadership Part One	22
Value independent assessment and peer review	SLWT Project - Reviews and Independent Assessment	Bryan O'Conner	My memory says we had 50 or 60 if you add them all up from start to finish, independent and peer reviews of one sort or another throughout this project. This team was not embarrassed to talk about their issues, claim their lack of understanding and asks for help. I think that is pretty key to success in a project.	SLWT Exercise 1: Risk Identification; video clip/transcript	22

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Verify each mate-demate for all electrical connection	Assembly and checkout procedures Quality assurance Electrical connections	Ron Welch	Often on complex setups, after a connection mate is made, connectors will become covered by other connectors or equipment in future assembly steps. Each mate or demate should have a one-on-one verification and be documented by the QA individual who personally witnessed the activity. This is extremely important and has the highest consequence for final mates prior to launch.	1363 Unverified Mating/Demating of Flight Connectors	22
Actively seek participant input in critical decision forums	MMT Process Improvement - Decision Making	Wayne Hale	The communications emphasis that we had on the MMT was that we called on everybody. So everyone was told that they were expected to participate in all discussions, every member of the MMT.	KBR 11937 Clip: Lessons Learned - Communications; Time marker: 01:10	32
Always have a Plan B and periodically reevaluate your Plan B	Operational contingency planning, risk management, ISS	Kirk Shireman	... the message here I think, or the thing to think about, is focus on the contingencies depending upon the phase of your program and know that they're going to evolve over time. So, when your program reaches another phase or about to enter another phase need to go back and reevaluate what are the contingencies	Space Shuttle T&R, Shireman Clip 7	32
Be wary of embedded assumptions in a critical decision environment - such as "there is nothing we can do"	MMT Process Improvement - Embedded assumptions within the decision forum	Wayne Hale	At all levels, management shut down these kinds of "let's try something" discussions with this "Well, there's nothing we can do" phrase. After 107, we took that out of our vocabulary. We are going to try to do something. It empowered people that had ideas and had concerns to come forward and express them. So that little culture switch that got flipped right there was really very critical. There is always something we can do.	KBR 11937 Clip: Lessons Learned - Culture Change; Time marker: 03:00	32

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Brainstorm everything in assessing critical decision forum effectiveness	MMT Process Improvement - Decision forum evaluation	Wayne Hale	We literally brainstormed everything that we could think of that would improve the decision making, retrain the managers, and address the perception problem	KBR 11937 Clip: Mitigation; Time marker: 01:50	32
Bring in outside opinions and consultants	MMT Process Improvement - Decision forum evaluation	Wayne Hale	We hired various consultants	KBR 11937 Clip: Mitigation; Time marker: 02:00	32
Build in a break to enable informal reflection and discussion prior to a decision	MMT Process Improvement - Decision Making	Wayne Hale	If we're discussing a difficult situation that's going to have complex ramifications, after looking at all the details, we're going to take a break. After that we would have the chair propose a course of action and then say "Now let's take a break and everybody go think about that." Go poll your delegations, go out in the hall and see if you have any more questions. Let's walk around and talk about it. So you get out of this formal, stilted hierarchy where we're all sitting around the table looking very solemn.	KBR 11937 Clip: Lessons Learned - Communications; Time marker: 03:30	32

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Change your plan	Planning Processes	Jonathan Krezel	Unanticipated consequences, your refinements and estimates are going to change. What are the processes you're going to leverage to make continual adjustments to your plan? Do you have to have rigorous documentation of those processes? Can they be handled more informally? That's going to change depending on the circumstance. Who do you have to interact with? Whose approval or consensus do you have to gather to make changes to that plan? How are you going to gather that consensus? So you have to think through your processes.	Space Shuttle Transition and Retirement Lessons CLIP 8 Top Three Takeaways: Time Marker 1:28	32
Demand cogent, clear, thorough presentation of safety critical information	MMT Process Improvement - Mission critical communication	Wayne Hale	It's not just PowerPoint or bullet charts but it's the mentality behind we have to cram very complex subjects into the fewest number of English words humanly possible. That's poor communication technique.	KBR 11937 Clip: Lessons Learned - Communications; Time marker: 08:20	32
Engage independent engineering and SMA organizations in identifying and assessing risk	MMT Process Improvement - Risk Management	Wayne Hale	We used these independent technical authorities, like Safety and Mission Assurance organization, like engineering organization, to help us categorize the risk, not just in this technical sense, but in this likelihood versus consequence base, and try to deal with them in an appropriate manner.	KBR 11937 Clip: Lessons Learned - Assessing Risk; Time marker: 03:00	32
Ensure the critical decision forum is an inclusive, positive physical environment	MMT Process Improvement - Decision forum environment	Wayne Hale	We rebuilt the Mission Management Team room. We decided we needed a bigger room. We needed a video conference. I was particularly adamant that we needed a round table; I didn't want to have a head of the table.	KBR 11937 Clip: Mission Simulations; Time marker: 03:00	32

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Implement training in interpersonal interaction - i	MMT Process Improvement - Decision forum participant training	Wayne Hale	We put all of our senior managers through what used to be called a "Cockpit resource management" which is a training that NASA developed with the FAA for airline pilots and air crews.	KBR 11937 Clip: Mitigation; Time marker: 02:10	32
Listen for weak but important signals	MMT Process Improvement - Leadership	Wayne Hale	We specifically trained our leadership to try to listen for weak signals and to understand that just because someone is not presenting very coherently or articulately doesn't mean that there isn't a concern there that we need to address.	KBR 11937 Clip: Mitigation; Time marker: 06:45	32
Practice, Practice, Practice	Critical Lifting Operations (Orbiters)	Stephanie Stilson	So the key lessons that we gained from this task was how valuable and important it is to do a dry run to begin with and while you're doing that go back and look at those procedures to see if you need to make changes that make it more understandable for the current culture that's working on that. ... we had public affairs film our dry runs ....	Space Shuttle T&R, Practice, Practice, Practice (Stilson Clip 4)	32
Prepare for and remain flexible enough to reformulate research questions	Crew / people / training / skill-set / Frontiers	Don Pettit	for me a frontier is a place where your normal intuition no longer applies and the answers are no longer in the back of the book –.....Here is the irony – you go into a frontier with a set of questions, you figure the answers out and after you look at the answers you say “we asked the wrong questions” and so now you formulate a whole new series of questions	ISS Video Dashboard Don Petit Clip 7	32

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Provide critical decision team participants with contingency response exercises	MMT Process Improvement - Decision forum participant training	Wayne Hale	We subjected the Mission Management Team to a number of integrated simulations, stressing problems that were related to TPS damage and those sorts of things but also including other unrelated problems. They were very effective; they made us think as a group, they educated the team on the entire operation, and folks that were not typically involved in the mission execution phase of the flight became very involved and actually, by virtue of being trained, smart, observant managers, provided really some key insights to the operations team from time-to-time on how to solve problems.	KBR 11937 Clip: Mission Simulations; Time marker: 02:00	32
Recognize the reality that an operational decision must be made - the least imperfect decision being the goal	MMT Process Improvement - Decision Making	Wayne Hale	We tried very hard to make people learn how to play nice together and in that way I think we over did it. There are some people that are never going to be satisfied. At some point you have to decide "Have we done good enough?" It is never going to be perfect. And that is the real heart of the whole thing.	KBR 11937 Clip: Lessons Learned - Culture Change; Time marker: 06:00	32

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Remain vigilant - stay worried about what could go wrong.	MMT Process Improvement	Wayne Hale	It takes vigilance, and that's what I would like to pass along, probably as a parting word, is you have to be vigilant. You have to always suspect that you're not as smart as you think you are, that things aren't going as well as you think they're going. You have to be hungry and worried about what could be going wrong. Those are the real keys in a high risk, high reliability organization, is you have to always be worried about making a mistake, about having an accident. That leads you to stay on your toes, being hungry, being vigilant, and if anything, that will prevent the accident that you're worried about.	KBR 11937 Last Clip: Key Remarks for the Future 1:20	32
Rethink communication modalities and effectiveness	MMT Process Improvement - Risk communication	Wayne Hale	We had Dr. Tuffte come and do his course on presentation materials. It did point out that some of the things we were doing were pretty horrific in the way that presentations were put together. It encouraged people to do more "white-papers" than PowerPoint presentations.	KBR 11937 Clip: Mitigation; Time marker: 03:30	32

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
We can do it - but we should minimize on-orbit assembly	On-orbit assembly	Mark Geyer	So I think we learned a couple things, we learned we can do, we absolutely can do complex assembly. I think in my mind, we also learned that we should avoid it when we can. So I'm a big fan of the big rocket because we should minimize this assembly because it adds risk every time you do it. But even with the big rocket we're going to have some. And so when you do that you need to lay out your plans, you need to figure out whose the responsibilities are, then you got to figure out a reasonable test program on the ground to flush it out.	ISS Video DashboardMark Geyer Clip 8	32
Benchmark internal organizations - share lessons learned	Program Transition Workforce Retention / Closeout, Process,42	Sue Leibert	We established some human capital working groups and human capital councils so that we could share best practices between what the contractors were doing and what the civil servants were doing.	KBR 11797 Clip: Mitigation of Risk 2; Time marker: 02:25	42
Closeout with Priority	People, Communication	Jonathan Krezel	So I think the lesson learned there is, in any activity, but particularly when you're doing a large program shutdown, make sure you have your priorities straight and certainly for human spaceflight that priority was on safe flyout.	Space Shuttle Transition and Retirement LessonsClip: 2 Start Up Transients: Time Marker 6:32	42
Don't try to reinvent ... reach out and leverage existing knowledge and expertise	Early Transition Planning /	Dorthy Rasco	... reach out to those that have the knowledge in the area that you don't have. Don't try to reinvent. Leverage off of the policies and the processes and the people that are within the Agency that's already available to help you with all of the areas that you're not as familiar with.	Space Shuttle T&R, Rasco Clip 2, Early Transition Planning	42

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Employ a structured risk management approach in transition	Program Transition Workforce Retention Closeout, Process,42	Sue Leibert	So the overarching risk mitigation plan was a combination of that program in conjunction with the projects, but it was around communication and partnerships, it's around retention tools, and it's around planning and helping people see future work. Of course as a piece of that you have to have your metrics and measures and assessments; how are you doing in that process.	KBR 11797 Clip: Mitigation of Risk 2; Time marker: 01:40	42
Expect late changes in requirements – maintain margin & flexibility	Requirements Management / Change Management / Margin / Flexibility	Stephanie Stilson	.....we thought we had defined all the requirements (what we needed to do, work we needed to do) to safe the vehicles and get them ready for delivery. Well then we found out that some new requirements were being generated. The Agency was wanting to see are there any components of these orbiters that we may want to retain for any studying, testing, potential future use, things that maybe we would like to gain and learn from these pieces of hardware.	Space Shuttle T&R, Adjusting to Late Changes (Stilson Clip 5)	42
Implement and use a risk management process	Closeout Risk Management	Dorothy Rasco	... one of the processes that is one of the most useful tools is the risk process. We used it so much, and it was one of our top priorities that we reviewed for the operations. And I kept it and continued using that same process for the Transition & Retirement,	Space Shuttle T&R, Rasco Clip 5	42
Keep core business management capability throughout program close-out	Contract closeout	Dorothy Rasco	.....make sure you that you maintain those best folks on your team until the very end ... legal, procurement, contracts	Space Shuttle T&R, Rasco Clip 4	42

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Leverage the support of subject matter experts in Human Resources	Program Transition Workforce RetentionCloseout, Process,42	John Shannon	You're not alone. I learned very early in running the program that if I had something I didn't know, especially about a personnel issue or HR or just how to deal with the emotions, I had help. Just make sure you use your team. Don't try to solve everything by yourself;	KBR 11797 Clip: Lessons Learned; Time marker: 01:30	42
Protect assets and documentation for the future.	Refurbishing Protecting Assets during close out	Kathy Owen and Jerry Oakley	Protect assets for future programs. Often test equipment is abandoned and not stored properly and may become damaged prior to use on a future program. So if at all possible, to preserve both the hardware and the documentations for potential future users. When starting a refurbishment activity, gather a lot of historical data. There was a variety of NASA archives were we went and got information, there was actually still some hard copy data that was stored in the test area, and we also had the great advantage that we could consult with two key people that were involved in the HDS activities previously. It was a great thing for us to be able to draw on those resources, as well as to have all of the documentation available that we were able to find.	11496 IVGVT last clip	42

**Addenda B: Process (Up-Front, Development, Operations, Close-Out) - consolidated 12, 22, 32, 42**

Tagline	Theme & Tags	Presenter	Abstract	Find It Here	Index
Set a budget baseline for closeout	Closeout Cost Estimates	Jonathan Krezel	it's okay to scope out the entirety of your effort up front and to really put a corner case estimate out there of what do you think it would cost, but in no way should you pretend that that estimate is gospel. That's your starting point. That's the starting point to really, in detail, lay out your assumptions and then through your subsequent processes, through subsequent planning, in our case we used the budget process, attack each of those assumptions and really work each of them hard until you get to the absolute core things that you have to do. So, using the budget as a way to attack assumptions was a key lesson learned from this.	Space Shuttle Transition and Retirement LessonsClip: 3 Start Up Transients: Time Marker 3:35	42
Use a systems engineering approach to tackle complex challenges	Planning, and systems engineering process	John Olson	... transition from the Space Shuttle to the follow-on program, it's really a large systems engineering problem. And I would even go further; I'd call it a system of systems engineering challenge. Of course that requires and necessitates a rigorous systems engineering breakdown and methodical approach to tackling it.	Space Shuttle T&R, Olson Clip 3	42