

IAF SPACE SYSTEMS SYMPOSIUM (D1)

Lessons Learned in Space Systems: Achievements, Challenges, Best Practices, Standards. (5)

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harry.jones@nasa.govSPACE PROGRAM ADVOCACY CAN DISTORT PROJECT MANAGEMENT AND DAMAGE
SYSTEMS ENGINEERING**Abstract**

Overoptimistic project advocacy often causes exaggerated performance claims and underestimated costs and schedules. This can distort project management and damage systems engineering. NASA projects such as the space shuttle and Hubble are extreme examples. NASA's spectacular success in the Apollo moon landings seems to have produced overconfidence and carelessness, but also to have gained tolerance for unrealistic claims and forgiveness when they were proven wrong. Apollo risk analysis predicted many astronaut fatalities. This was believed but was potentially damaging to the Apollo program, so risk analysis was discontinued. The moon landings beat bad odds because Apollo obsessively reduced risk. Its success seemed to confirm that risk analysis was unreasonably pessimistic and that risk could be overcome by good engineering. This understanding caused risk to be neglected in space shuttle engineering and led to an unnecessarily dangerous approach. The shuttle design placed a fragile spacecraft next to the fuel tanks and failed to provide a launch abort system. These design decisions directly caused the Challenger and Columbia tragedies. After Challenger risk analysis was reestablished. The current rocket and capsule design does consider risk and the result strongly resembles Apollo. Apollo advocacy led NASA to abandon risk analysis and this was ultimate cause of the Shuttle tragedies. Other examples are given and possible remedies are discussed.