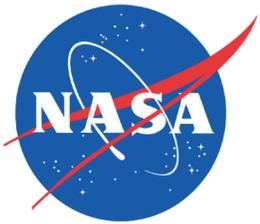


The Role of V&V in Decisions Based on M&S

Thomas A. Zang
NASA Langley Research Center

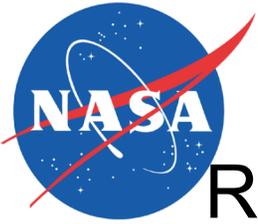
Chair, NASA M&S Standard Topic Working
Group



Decision Setting

STS-121 Flight Readiness Review June 2006





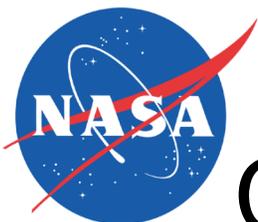
PRAs at STS-121 FRR

Risk to Orbiter Due to Foam Impact Damage

- Organization A: 1/27
- Organization B: 1/120
- Organization C: 1/300

- Which result is most “credible”?

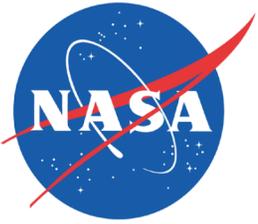
- *19 Shuttle flights remained at STS-121 FRR – 1/27 corresponds to a 51% chance of loss of an orbiter during those 19 flights*



STS-121 Certificate of Flight Readiness

STS- 121 CoFR ENDORSEMENT	
CONCURRENCE	
<p>I have conducted a review for this mission and have determined that the technical products, processes, policies, and technical requirement variances for the Space Shuttle and International Space Station (for ISS missions) systems have been satisfactorily dispositioned, and that all associated residual technical risks have been appropriately characterized and accepted by Engineering and the Programs. I concur with proceeding with this mission. <i>I REMAIN NO GO BASED UPON POTENTIAL LOSS OF VEHICLE HOWEVER FOR THIS MISSION I HAVE NO INTENTION TO APPEAL THE DECISION BASED UPON ISS CAPABILITY TO PROVIDE CSCS.</i></p> <p><u>C. J. SCOLESE</u> <i>[Signature]</i> <u>17 JUNE 2006</u> NASA CHIEF ENGINEER DATE</p>	
<p>I have reviewed with the Space Shuttle Program and Center S&MA organizations the status of preparations for this mission including the Launch On Need (LON) rescue mission as briefed (if required, a LON FRR will be conducted and flight certification will be signed), and the readiness of the International Space Station for launch and on-orbit operations (for ISS missions), including the uncertified Contingency Shuttle Crew Support (CSCS) operation, as briefed. I concur with proceeding with this mission. <i>I AM NO GO BASED ON LOSS OF VEHICLE RISK (WE PROST RAMPS). BASED ON APPEAL TO ADMINISTRATOR I HAVE NO INTENTION TO APPEAL HIS RISK ACCEPTANCE AND CONCUR WITH PROCEEDING WITH MISSION</i></p> <p><u>B. D. O'CONNOR</u> <i>[Signature]</i> <u>17 JUNE 06</u> CHIEF OF SAFETY AND MISSION ASSURANCE DATE</p>	
APPROVAL	
<p>The FRR Board has conducted a comprehensive assessment of the readiness of all flight and ground systems and supporting personnel. For ISS missions, the FRR Board has also conducted a comprehensive assessment of the readiness of the Launch Package/Cargo Element (LP/CE), ground hardware/software support facilities and personnel to support the flight, stage and increment including the readiness of the on-orbit stage to accept the LP/CE and return items. The Certificate of Flight Readiness has been endorsed by each program element. I have concluded, with the concurrence of the FRR Board, that pending completion of planned work, the Space Shuttle Program is ready to execute this mission, including the LON rescue mission as briefed (if required, an LON FRR will be conducted and flight certification will be signed), and the International Space Station Program is ready for launch and on-orbit operations (for ISS missions) including the uncertified CSCS operation, as briefed.</p> <p><u>W. H. GERSTENMAIER</u> <i>[Signature]</i> <u>17 June 06</u> ASSOCIATE ADMINISTRATOR, SPACE OPERATIONS MISSION DIRECTORATE (CHAIR, FRR BOARD) DATE</p>	





Challenge to Participants

- What do you have to offer
 - to the NASA and contractor engineers performing M&S in support of flight safety decisions?
 - to the decision makers who have to decide how credible the M&S results are?