

NASA Risk Management Conference 2005 (RMC VI)

**“A Formal Lessons Learned Process as an
Effective Countermeasure Against ‘Known’
Risks”**

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Lessons Learned as an RM Tool



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- Most mature engineering organizations employ a formal lessons learned process as an effective countermeasure against avoidable risk.
- Should the *lessons learned process* be recognized in risk management planning?
 - Consider some examples outside the NASA sphere



- NPR 8000.4, *Risk Management Procedural Requirements*, points to lessons learned as a “useful source” of risk data



NASA Lessons Learned System Flaws



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- NPR 7120.6, *The NASA Lessons Learned Process*, issued March 22
 - NASA Chief Engineer: “NASA lessons learned are not widely used.” We need a process for validation and QA, and to achieve a closed loop on the recommendations
- Why is NASA placing a renewed emphasis on lessons learned?
 - Repeated mistakes, or violation of known best practices, pose a risk that is potentially avoidable
 - *“Progress, far from consisting of change, depends on retentiveness... Those who cannot remember the past are condemned to repeat it.”* -George Santayana
 - *“An expert is someone who knows some of the worst mistakes that can be made in his subject, and how to avoid them.”* -Werner Karl Heisenberg
 - Diaz Report assessed the agency-wide applicability of the CAIB report
 - “... require that everyone understand their responsibilities and are given the authority to perform their jobs, with the accountability for their individual and program’s successes and failures, including lessons learned.” (Page 10)
 - “The CAIB concluded NASA ‘has not demonstrated the characteristics of a learning organization’ after investigators observed mistakes being repeated and lessons from the past apparently being relearned.” (Page 11)



A Formal Lessons Learned Process



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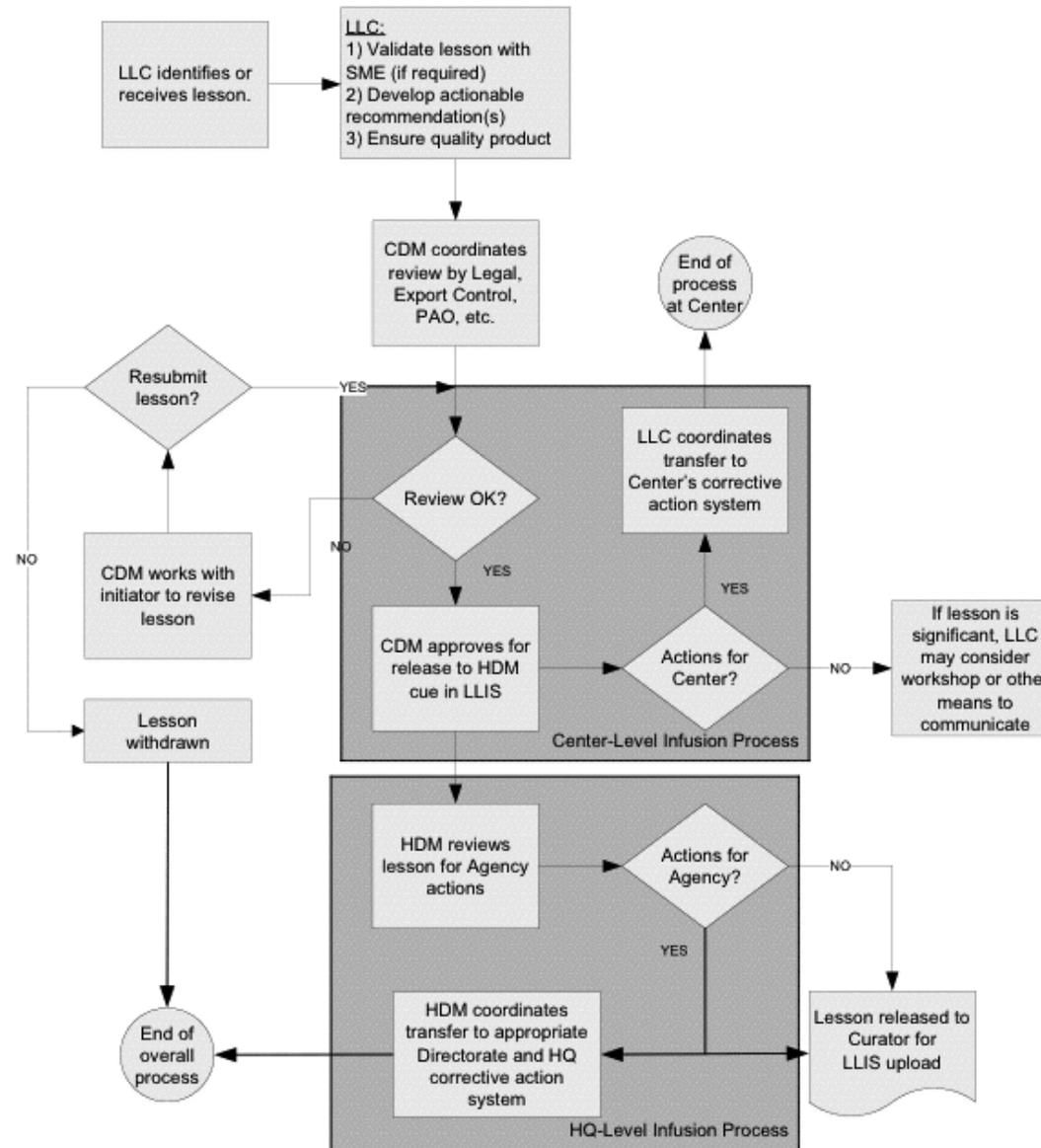
- NASA has maintained a lessons learned system since 1992
 - 1500+ (full text searchable) lessons are accessed 2500 times per month
 - The new NASA Engineering Network (NEN) will provide links from lessons to other engineering resources: <http://nen.nasa.gov/portal/site/llis>
- NASA and the Centers have employed, for the most part, an ad hoc lessons learned process
 - Lack of a formal, controlled process can lead to ineffective NASA-wide coordination, and ineffective Center solicitation and prioritization of candidates, status tracking, review/approval, dissemination, etc.
- NPR 7120.6, *The NASA Lessons Learned Process*, establishes a formal process with consistent NASA Center and contractor practices
 - Each Center must now have a Lessons Learned Committee
 - Lesson learned recommendations must now be “infused” into business practices (procedures and training for engineering/acquisition)
 - NPR “rollout” workshops have been conducted at all NASA Centers



NASA LL Process Flowchart



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Late Addition of TIRS to Mars Rover



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- Local winds on Mars could have caused the MER lander to graze the rugged Martian terrain at a high lateral speed, rupturing the airbags
- Although the need could not be proven, a Transverse Impulse Rocket System (TIRS) was added to MER only 1.5 years before launch



Test stand firing of RAD and TIRS
(TIRS = small horizontal plume)



Animation (based on actual
landing data) depicting TIRS firing
to correct Spirit drift.



Image of the Gusev Crater taken by the
Descent Image Motion Estimating
System (DIMES) camera as the Spirit
lander descended to Mars.

- **Lesson learned:** Data returned from the Spirit landing in Gusev Crater validated the risk item and the TIRS/DIMES mitigation measure



Lessons Learned as an RM Tool



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- Lessons learned document proven risks: the driving event one describes has occurred at least once, is a “tall pole,” and may recur
- Closed-loop disposition/infusion implies that the lesson learned recommendations are “actionable,” and applicable to other projects
- The NASA lesson learned process may be gaining the maturity needed to rely on it as an effective input to risk management
- Lessons learned represent pre-verified and pre-validated risk items for the SRL process to evaluate further. Also, the new closed-loop “infusion” process may help identify which risks may be retired.
- Should vetted lessons learned be incorporated into the project RM plan? If so, how?