



Ultra Reliability Workshop

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Welcome



Outline



- Acknowledgements
- Center Representatives
- Ultra-Reliability Background
- Focus Areas
- Relationship to CEV/CLV
- Workshop Expectations
- Conclusion



Acknowledgements



- Sponsor: Phil Napala – NASA HQ, S&MA
- This program was carried out, in part, at the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.
- This plan is the accumulation of substantial work by a large number of individuals. The Ultra-Reliability team consists of representatives from each center who have agreed to champion the program and be the focal point for their center. A number of individuals from NASA, government agencies (including the military), universities, industry and non-governmental organizations also contributed significantly to this effort. Most of their names may be found on the Ultra-Reliability PBMA website.



Center Representatives



Marcus Murbach, ARC

Edward Zampino, GRC

Bob Beaman, GSFC

Lydia Lee, GSFC

Phil Napala, HQ, (Program Sponsor)

Martin Feather, JPL

Henry Garrett, JPL

Nelson Green, JPL

Andrew Shapiro, JPL (NASA Program Manager)

Pedro Curiel, JSC

Jane Malin, JSC

Jan Railsback, JSC

Henk Rolent, JSC

Gena Humphrey, KSC

Natesan Jambulingam, KSC

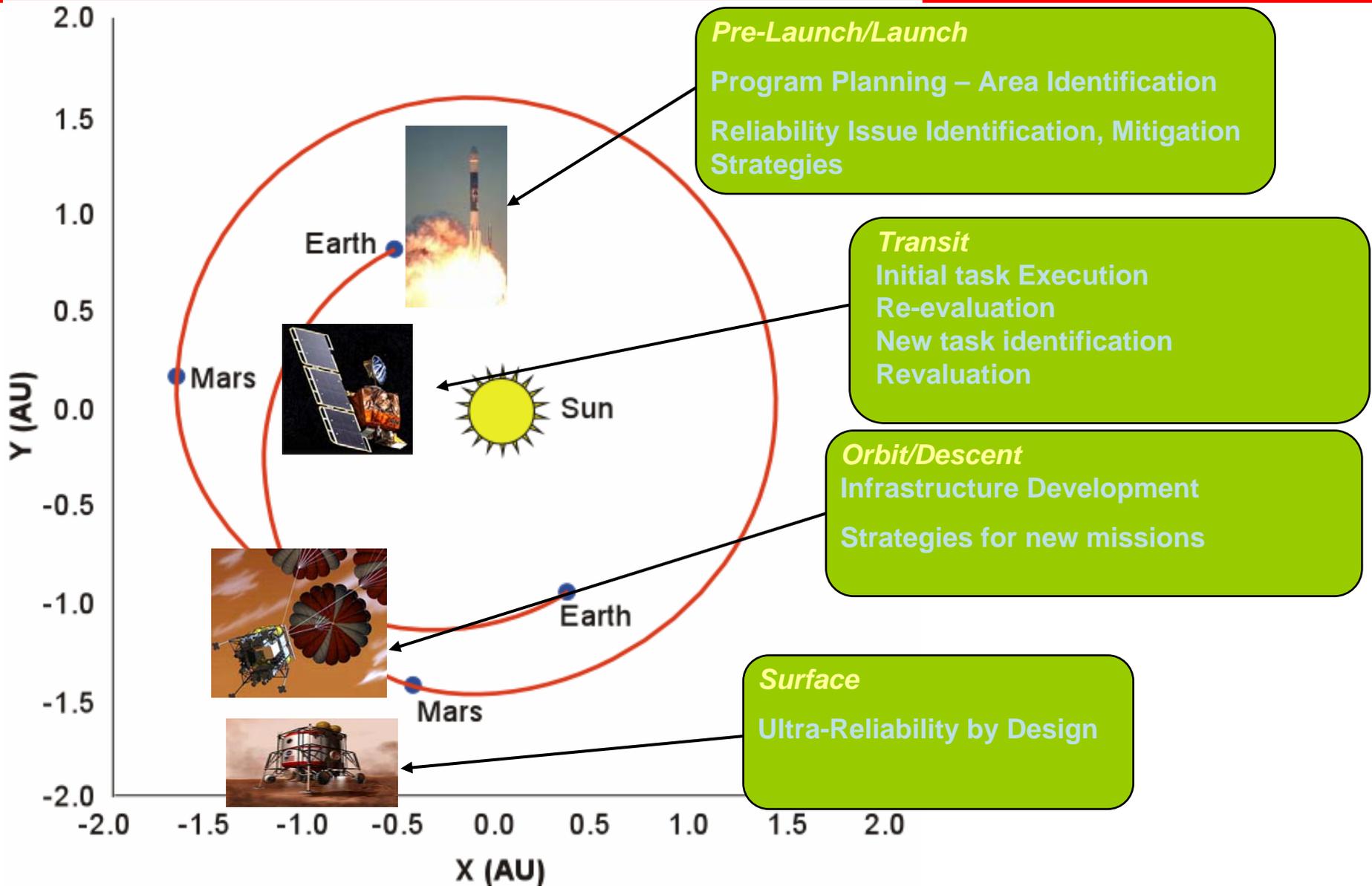
Duane Pettit, LaRC

Prince Kalia, MSFC

Mike Rewis, SSC



- Program Started in 2002 with a workshop on Ultra-Reliability
- Started as a NASA-wide program in 2004 as a working group with all NASA centers
- Workshops on Long-Life Missions, Launch Vehicles, Human Interactions and Manned Space Vehicles held in 2004
- AIAA session on Ultra-Reliability in 2005
- Numerous journal, conference and NASA publications





Global Objective



The objective is to achieve NASA-wide reliability of one order of magnitude better than today (determined at 2002 meeting)

- Definitions

- Ultra-reliability

- For a particular technology, given a specific time frame – reliability one order of magnitude more than current standard

- Long Life

- Missions with a design lifetime of 20 years or more (a subset of Ultra-Reliability)



The approach for this program involved five steps:

1. Divide NASA systems into seven areas;
2. Establish areas champions and representatives from each NASA center;
3. Develop a reliability issue list for each area using a team of NASA experts in each area with the sector champion facilitating the effort;
4. Develop mitigation strategies for each of the areas' issues lists and ranking their importance by holding a workshop or with a working group of area experts from government (NASA and non-NASA), universities and industry;
5. Develop a set of tasks for each area in order of importance for improving the reliability of NASA systems
6. Select focus areas for study



Focus Areas



- Five focus areas were selected for study in 2005 and 2006 (with the intent of eventually supporting CEV/CLV) these were:
 1. Long-life missions
 2. Spacecraft failure history
 3. Software reliability
 4. Integrated Vehicle Health Management
 5. Failure analysis database



- Vehicles (robotic or manned) may have extended life missions
- Integrated Vehicle Health Management will clearly be important
- Software reliability will play an increasingly important role due to (among other things) increased complexity and expectations
- Failure history analysis and database will characterize what has gone wrong before (by technology, mission phase, etc.) as well as containing test failure data



Workshop Expectations



- Review of common areas where the UR team/infrastructure can best assist CLV/CEV with improving their reliability profile
- Adaptation of specific UR tasks for CEV/CLV support
- Identify new CEV/CLV/UR issues for UR team to focus on



ONE NASA



- This program is NASA-wide:
 - to address different ultra-reliability needs in different NASA Enterprises
 - to leverage the wide variety of expertise across all of NASA
 - to leverage overlapping reliability issues
 - to take advantage of related on-going NASA tasks
- Metric for leveraging of internal S&MA research
- The development of reliability assessment is a key for success
 - Intelligent consistent use of existing NASA methods and an opportunity to develop novel ways of assessing reliability