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# Command File Error Reduction Initiative

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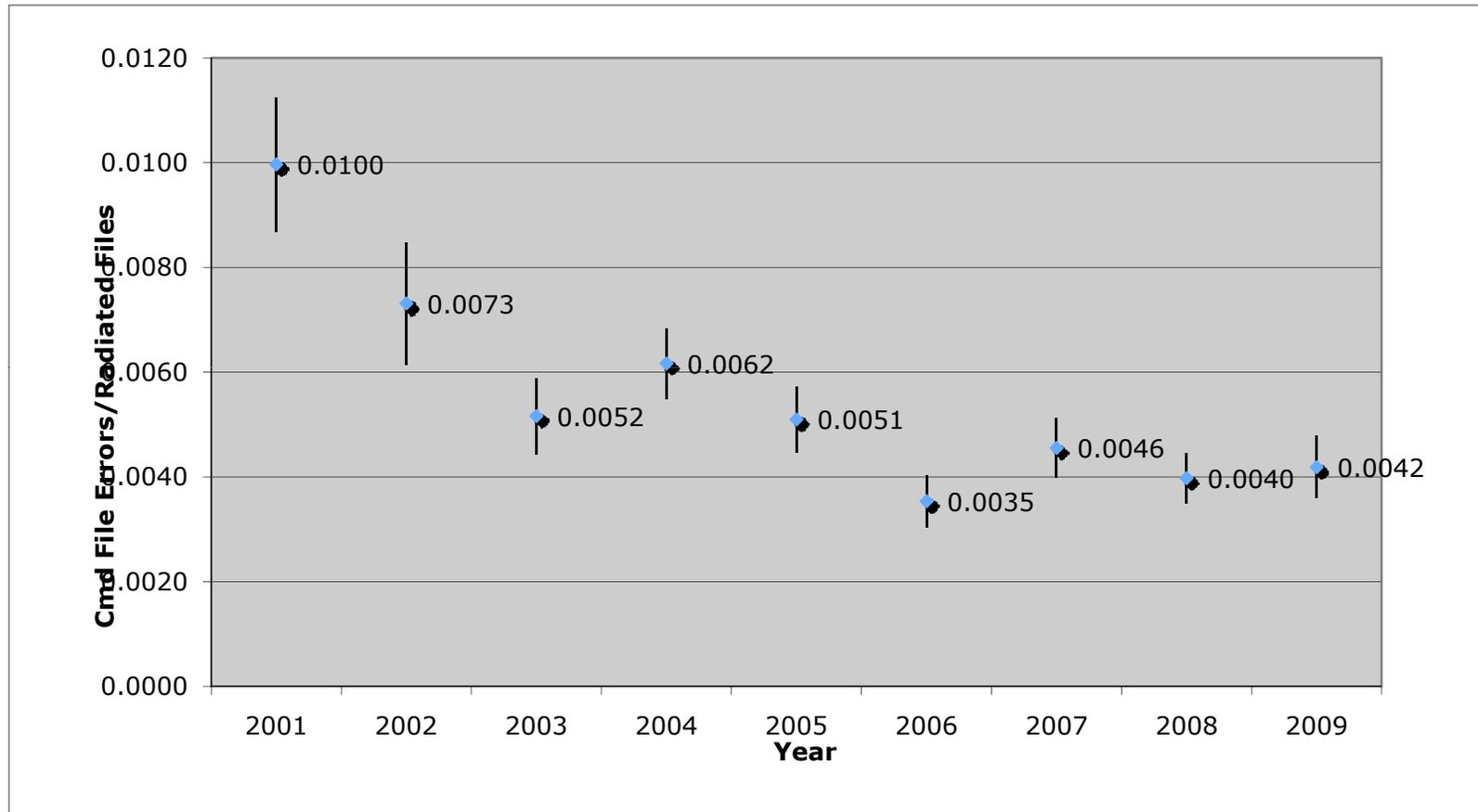
# JPL's Anomaly Resolution Standard

## Appendix B, Para. 2.11

A command file error is:

- an error in a command file that was sent to the spacecraft;
- an error in the approval, processing, or uplinking of a command file that was sent to the spacecraft;
- the omission of a needed command file that was not uplinked to the spacecraft.

# Aggregate Command File Error Rate



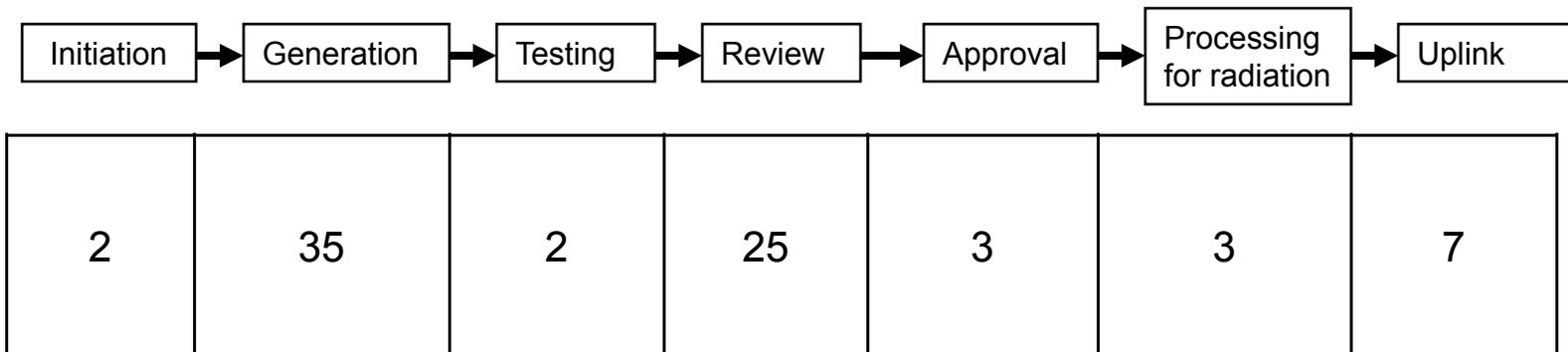
Projects included are MGS, Stardust, Mars Odyssey, Genesis, Spitzer, Mars Reconnaissance Orbiter, Phoenix, Galea, Dawn, MER A, MER B, Cassini.

# Command File Error Initiative

## **GOAL: Improve the reliability of the command file uplink process**

- Conduct monthly meetings to discuss command file errors with emphasis on proximate/contributing/root cause, and corrective and preventive actions.
  - Command File Error Working Group (CFEWG) attendance Includes:
    - Chief/Project Mission Operations Assurance Managers
    - Spacecraft Team Leads
    - Flight Controller Group Supervisor
    - Sequence Flight Engineering Group Supervisor
    - Others, as required
- Improve reliability of the uplink process by infusing corrective and preventive actions across all projects.
  - Disseminate information to the institutional group supervisors for flight control, sequencing, flight engineering, science system engineering for applicability across projects currently in operations.
  - Disseminate information to the institutional multi-mission organization, mission operations systems engineering, and ground data systems engineering for process/procedural improvements along with software tool development.
  - Disseminate information to the project managers/mission managers/spacecraft team chiefs for flight team training and process/procedural/tool improvement suggestions.
  - Disseminate information to the Project Support Office for FPP/DP consideration.
- Inform senior laboratory management on command file error trends and corrective/preventive actions taken.
- Establish a command file error centralized database – proposing to automate it within the new PRS system.

# COMMAND FILE ERROR LOCATIONS – 2009



- The majority of the errors in 2009 were in the generation and review steps of the command uplink process.

# Organizational Options to Address Command File Errors

- Option 1: Identify the responsible organization to take the lead in assessing the command file errors, ensuring improvements are incorporated into the projects, line and multi-mission organizations in the form of procedural modifications, tool developments, and the conduct of periodic flight team training.
- Option 2: Distribute the command file error material to the directorates, program and project offices, and multi-mission and line organizations for their assessment of the command file errors and incorporating improvements into the projects, line and multi-mission organizations in the form of procedural modifications, tool developments, and the conduct of periodic flight team training.
- Option 3: Combination of option 1 and 2.
- Others ?

# Recommended Steps to go Forward

- Establish a standing operations group to provide a forum for operational issues.
- Initial tasks for the group to include:
  - Establish a goal to reduce the aggregate command file error rate by TBD.
  - Establish a standardized command uplink process terminology to be used by all operational projects and for collecting metrics.
  - Review the 2009 command file errors to determine where in the command uplink process the errors occurred.
  - Focus improvements efforts in the areas of the command uplink process which will afford the highest payoffs in the areas of procedural modifications and tool development.
  - Review and recommend standardized uplink tool developments to be implemented across projects.
  - Have each operational project develop a training package describing their command uplink process using the standardized terminology developed above with specific emphasize on best practices.
  - Share project specific command uplink process material across all operational projects and with the command uplink process owner and incorporate improvements, were identified.
  - Establish a flight team training requirement to review their command uplink process on a TBD time interval emphasizing best practices and incorporating the improvements which will be continually folded in as a result of reviewing ongoing command file errors.
  - Draft operational Flight Project Practices on the requirements for command file error metrics and ongoing flight team training and recertification throughout the operational phase of the mission.
  - Provide a data repository for command file error metrics and flight team training material.

