

# The On-Board Software Manager for the Remote Agent Experiment on Deep Space One

E. B. Gamble, Jr. <sup>†</sup>  
ed.gamble@jpl.nasa.gov  
818-354-5387

Barney Pen <sup>‡</sup>  
pell@ptolemy.arc.nasa.gov  
650-605-3361

P. Pandurang Nayak <sup>§</sup>  
nayak@ptolemy.arc.nasa.gov  
650-604-4756

Doug Bernard <sup>†</sup>  
doug.bernard@jpl.nasa.gov  
818-354-2597

## Abstract

The Deep Space One (DS1) mission is the first in the New Millennium program and part of NASA's "smaller, faster, cheaper" mandate for flight project development. Like all New Millennium missions, DS1 is a technology validation mission; one of the advanced technologies to be validated for spacecraft readiness is the "Remote Agent Experiment" (RAX). RAX is an on-board, autonomy software system that will control portions of the DS1 spacecraft at 90 days post-launch. The RAX Manager is a DS1 flight software subsystem that defines the interface between the R4X software itself and the flight software proper.

Technology validation within a flight project is always a challenge, because as-yet invalidated technology can have a major adverse impact on the overall flight project. When new system-level software control technologies, such as RAX, require validation, the impact can be especially acute. Potentially adverse impacts include uncertain resource requirements, ill-specified interfaces, additional schedule dependencies, testing complications, and new in-flight failure modes. Through the application of software engineering concepts and management processes designed to minimize impact and risks, the RAX manager mitigates these adverse impacts. As a result the RAX Manager enables the full validation of RAX technology during a meaningful phase of the DS1 mission.

We describe the concepts and the process which resulted in the RAX Manager and its role in the broader flight software development process. The approach we used can serve as a template for validation of new software technologies in future missions.

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<sup>†</sup>Jet Propulsion Laboratory, California Institute of Technology, 4800 Oak Grove Drive, Pasadena, CA 91109.

<sup>‡</sup>Caelum Research, NASA Ames Research Center, Moffett Field, CA 94035.

<sup>§</sup>Recom Technologies, NASA Ames Research Center, MS 269/2, Moffett Field, CA 94035.