Program Management Tool

Ames Research Center, Moffett Field, California

The Program Management Tool (PMT) is a comprehensive, Web-enabled business intelligence software tool for assisting program and project managers within NASA enterprises in gathering, comprehending, and disseminating information on the progress of their programs and projects. The PMT provides planning and management support for implementing NASA programmatic and project management processes and requirements. It provides an online environment for program and line management to develop, communicate, and manage their programs, projects, and tasks in a comprehensive tool suite. The information managed by use of the PMT can include monthly reports as well as data on goals, deliverables, milestones, business processes, personnel, task plans, monthly reports, and budgetary allocations.

The PMT provides an intuitive and enhanced Web interface to automate the tedious process of gathering and sharing monthly progress reports, task plans, financial data, and other information on project resources based on technical, schedule, budget, and management criteria and merits. The PMT is consistent with the latest Web standards and software practices, including the use of Extensible Markup Language (XML) for exchanging data and the WebDAV (Web Distributed Authoring and Versioning) protocol for collaborative management of documents. The PMT provides graphical displays of resource allocations in the form of bar and pie charts using Microsoft Excel Visual Basic for Application (VBA) libraries.

The PMT has an extensible architecture that enables integration of PMT with other strategic-information software systems, including, for example, the Erasmus reporting system, now part of the NASA Integrated Enterprise Management Program (IEMP) tool suite, at NASA Marshall Space Flight Center (MSFC). The PMT data architecture provides automated and extensive software interfaces and reports to various strategic information systems to eliminate duplicative human entries and minimize data integrity issues among various NASA systems that impact schedules and planning.

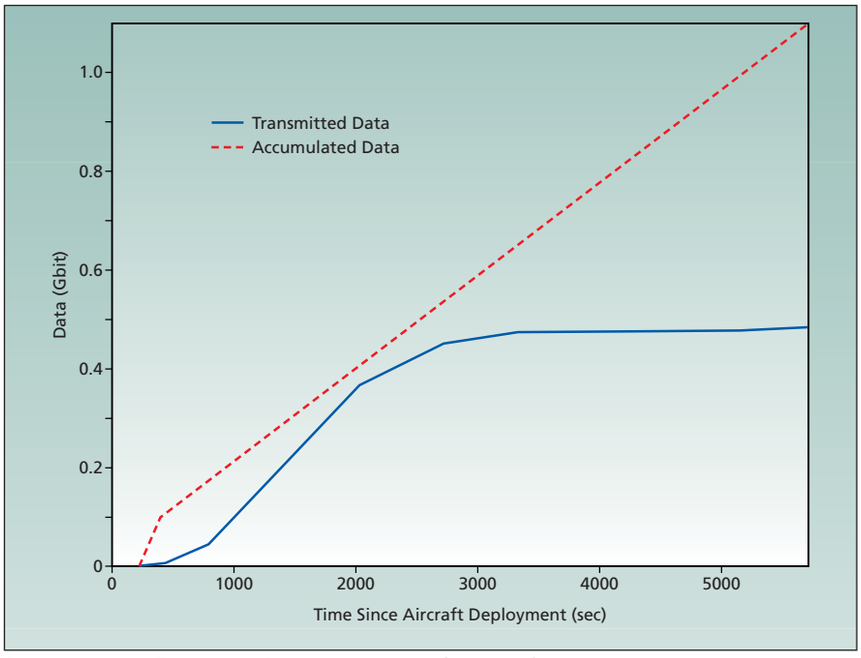
This work was done by Yuri Gawdiak and Alan Wong of Ames Research Center; David Maluf, David Bell, and Mohana Gurram of Universities Space Research Association/RIACS; Khai Peter Tran, Jennifer Hsu, and Kenji Yagi of QSS Group, Inc.; and Hemil Patel of SAIC.

This invention is owned by NASA and a patent application has been filed. Inquiries concerning rights for the commercial use of this invention should be addressed to the Ames Technology Partnerships Division at (650) 604-2954. Refer to ARC-14950-1.

Flyby Geometry Optimization Tool

Langley Research Center, Hampton, Virginia

The Flyby Geometry Optimization Tool is a computer program for computing trajectories and trajectory-altering impulsive maneuvers for spacecraft used in radio relay of scientific data to Earth from an exploratory airplane flying in the atmosphere of Mars. This program implements a genetic algorithm (GA) to choose trajectories to maximize the volume of data relayed via at least one of three spacecraft: a main spacecraft in a hyperbolic orbit and two alternate spacecraft in elliptical orbits about Mars. [The GA approach is ideal for this type of optimization problem, wherein discrete data-transmission rates lead to discontinuities in data-collection volumes that one seeks to maximize. Such discontinuities are typically problematic for other optimization methods — especially, gradient search methods.]



Accumulated and Transmitted Data are shown as a function of time.

The GA code is used to calculate a maneuver made by the main spacecraft prior to its periapse passage, to set up a favorable orbital geometry for communication with the airplane. The maneuver is chosen to maximize the total volume of data (see figure) transmitted from the airplane to the spacecraft. Then the program causes the data to be transmitted from the airplane to whichever spacecraft offers the highest data rate.

This program was written by Christopher D. Karlgaard of Analytical Mechanics Associates, Inc. for Langley Research Center. Further information is contained in a TSP (see page 1). LAR-16884-1