



Chapter I

Learning from Simple Systems: The Case of JPL 101

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EXECUTIVE SUMMARY

This chapter describes the development and operation of a knowledge system to support learning of organizational knowledge at the Jet Propulsion Laboratory (JPL). It describes in detail requirements generation, implementation, and rollout of the system and presents results from performance and usage data collected over 19 weeks of operation. Although the underlying technology was relatively straightforward, the development process had to address concerns from multiple stakeholders, support a broad user base, and incorporate a cost-effective approach to knowledge validation. These, in turn, impacted requirements, design, and maintenance of the system and how it was deployed within the organization. This case demonstrates that a relatively “simple” system can effectively support learning or organizational knowledge, while still presenting a variety of challenges during the implementation process.

BACKGROUND

The Jet Propulsion Laboratory (JPL) is a federally funded research and development center (FFRDC) operated for the National Aeronautics and Space Administration (NASA) by the California Institute of Technology (Caltech). JPL’s history dates to the

1930s and Caltech's pioneering work in rocket propulsion. After two decades of support to the Army, JPL was transferred to NASA in December 1958. JPL brought with it experience in building and flying spacecraft, an extensive background in solid and liquid rocket propulsion systems, guidance, control, systems integration, broad testing capability, and expertise in telecommunications using low-power spacecraft transmitters and very sensitive Earth-based antennas and receivers.

Following the success of Sputnik, JPL developed the first U.S. satellite, Explorer 1. In the 1960s, JPL began to conceive and execute robotic spacecraft to explore other worlds. Ranger and Surveyor missions were launched to the moon, and Mariner missions visited Mercury, Venus, and Mars. JPL has since achieved stunning successes with an armada of missions such as Voyager, Galileo, Magellan, Deep Space 1, and Mars Pathfinder. It also had to deal with highly publicized failures such as the Mars Climate Orbiter and Mars Polar Lander missions. JPL is currently operating several missions (e.g., Cassini mission to Saturn, the Stardust comet sample return, Spitzer space observatory, and the twin Mars Exploration Rovers, Spirit and Opportunity), with many new missions in various stages of development.

As a major national research and development (R&D) laboratory, JPL's mission is

1. to explore our own and neighboring planetary systems;
2. to search for life outside the Earth's confine;
3. to further our understanding of the origins and evolution of the universe and the laws that govern it;
4. to make critical measurements to understand our home planet and help protect its environment;
5. to apply JPL's unique skills to address problems of national significance and security;
6. to enable a virtual presence throughout the solar system by creating the Interplanetary Network; and
7. to inspire the next generation of explorers.

In pursuit of this mission, JPL has a rich program of technology development, science, and mission development (the three "value-adding" processes of the Laboratory).

To enable the mission of the Laboratory, JPL boasts an extensive infrastructure of research, fabrication, test and design facilities and tools. Employees make use of a robust and extensive intranet, serviced by high-speed networks, internal and public access portals, and a multitude of Web-based systems, for example, to support accounting, human resources, document management, and internal communications functions. Hundreds of thousands of Web pages are published by individuals, teams, and organizations, and are accessible through directory and search utilities.

JPL covers 177 acres north of Pasadena, California. The university-like campus is home to about 5,500 employees and on-site contractors. Nearly three quarters of the workforce are involved in R&D activities in support of the three value-adding processes. Of the R&D personnel, roughly one third have PhDs, and an additional one third have master's or professional degrees. JPL has an annual operating budget of approximately \$1.4 billion. Additional information about JPL can be found at www.jpl.nasa.gov.

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