

Chapter VI

An Internet-Based Workflow System: The Case of Lawrence Livermore Laboratories' Zephyr Project

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ABSTRACT

Lawrence Livermore National Laboratories' Zephyr System demonstrates how emerging technologies can help streamline procurement processes and improve the coordination between participants in engineering projects by enabling new ways of collaboration. The project also shows the success of a highly pragmatic approach that intentionally covered only standard situations, rather than additionally automating the exceptions. Assigning purchasing responsibilities to the end user reduces the involvement of the purchasing department in operational activities. This streamlined the process, resulting in major time savings, cost reductions, and improved quality. Left with less day-to-day purchasing operations, the purchasing department has more time for strategic tasks such as selecting and pre-qualifying new suppliers, negotiating contracts, or implementing new procurement systems. The case reinforces the notion that the use of information technologies can result in major benefits when aligned with process re-organization efforts.

BACKGROUND

In 1949, San Francisco saw the christening of the California Zephyr train that subsequently connected Oakland and Chicago until 1970. The route of the California Zephyr covered 2,525 miles and took an average of 2 1/2 days to complete, without changing trains. The innovative stainless-steel streamliner helped speed up the time to travel between the U.S. West Coast and the industrial areas in the North and East.

Similarly, the eponymously named Lawrence Livermore National Laboratories' (LLNL) Zephyr project helps accelerate business processes from concept through delivery and payment of engineering prototypes by connecting LLNL's engineering, procurement, and suppliers. Initiated in 1994, the project is conducted by LLNL's Engineering Directorate in partnership with Procurement, Administrative Information Systems, and Computations. It shows the benefits of moving an inter-organizational process from a traditional paper-based path to a Web- and e-mail based distributed workflow system. A closer look at the system reveals several factors that were critical to its success such as accompanying organizational changes.

Our information draws on several onsite interviews with project participants, as well as information available from LLNL's Web site, project reports, and research papers. Lawrence Livermore National Laboratory (LLNL) is a research and development (R&D) facility, located in Livermore, California, and operated by the University of California under a contract with the U.S. Department of Energy. The Lab was established in 1952 to perform research on nuclear weapons and magnetic fusion energy. It is also responsible for the stewardship of the U.S. nuclear stockpile. Currently, it hosts six major programs: Defense and Nuclear Technology; Laser Programs; Non-proliferation, Arms Control, and International Security; Energy Programs; Environmental Programs; Biology and Biotechnology Research. Each of the specific programs is sharing support from four more general scientific and engineering directorates: Chemistry and Materials Science, Physics and Space Technology, Computation, Engineering

The Engineering Directorate, the focus of this case study, involves about 2,100 technical and administrative employees and is divided into two organizations, mechanical and electronics engineering. Both organizations share support from five activities, which cut across all areas of Engineering: Engineering Research, Computers, Recruiting, Continuing Education, and Safety and the Environment.

Formally, LLNL is part of the U.S. Department of Energy, and it focuses most of its research on defense related issues. The recent political changes that followed the fall of the Iron Curtain resulted in reduced financial budgets for defense issues, and a more stringent justification of research projects. Formerly extremely secluded institutions now see themselves competing with research facilities from all over the world, including the ex-nemesis Russia. At the same time opportunities for collaboration open up. With increased openness public awareness grows and this further increases the pressure to deliver high-quality results efficiently.

SETTING THE STAGE

Most of the work at LLNL is engineering related, i.e., the design and manufacturing of complex systems. Its outcome is usually based on tight collaboration among engineering specialists, not only within LLNL but also with partners of other research institutions,

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