Application of Tree-Based Solutions: A Case Study With INEEL

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EXECUTIVE SUMMARY

This case is a study of the application of tree-based solutions to Idaho National Engineering and Environmental Laboratory (INEEL) challenges in the development of a computerized system to meet complex, yet exacting compliance requirements extended to thousands of employees in a large-scale organization. We rehearse the history of the project and include information on the theoretical structure of the tree-based solution used. Using primary research documentation, we use a constructivist approach to the issue of subject matter expert empowerment, a major theme of the case. Of particular interest is how the engineer in question was able to modify his work paradigm to incorporate a new role as digital content designer and overseer of the project. Additionally, the study concentrates on the overall effects of the project on other INEEL systems and working environments at the INEEL. Implications of management- and subject matter expert-directed system design projects using tree-based tools are considered with respect to all aspects of enterprise systems development.

BACKGROUND

The INEEL is located in the northeastern portion of the Snake River Plain in southeastern Idaho near the foothills of the Little Lost, Lemhi, and Bitterroot Mountains. With a military and nuclear energy history of management by the federal government, during World War II, the INEEL supported the United States Naval Ordnance Plant in Pocatello Idaho, serving as a practice site for naval gunnery up to the period of the Vietnam War. In 1949, the federal government named the site as the National Reactor Testing Station, a site where prototype nuclear reactors could be designed, built and tested. From that time, 52 "first of a kind" reactors have been built and tested at the INEEL. Projects have been conducted for the Department of Energy, the Atomic Energy Commission and the Department of Defense–particularly the U.S. Navy and the U.S. Army. The site has operated under three names. The original name, National Reactor Testing Station, was changed in 1974 to the Idaho National Engineering Laboratory. In 1997, the site's name was further modified to the Idaho National Engineering and Environmental Laboratory. At present, the mission of the laboratory is to lead in systems engineering and the development and application of environmental technologies.

The INEEL functions under the auspices of the Department of Energy's Idaho Operations Office. Overall, the facility encompasses more than 1,000 buildings of various kinds covering 890 square miles of territory in southeastern Idaho, an area approximately 85% of the size of the state of Rhode Island. The facility encompasses a combined total of 177 miles of paved roads and public highways, 56.5 miles of electrical transmission lines and 14 miles of railroad lines linking ten major facilities clusters. With administrative facilities in Idaho Falls, the INEEL employs approximately 6,000 people with varied backgrounds and professional interests, as is understandable in an institution with such a comprehensive and varied mission. The annual budget of the facility is approximately $700 million.

Currently, there are three companies, Bechtel B&W Idaho, Argonne National Laboratory - West and Bechtel Bettis that are under contract to perform research, waste processing, and support functions for the Department of Energy at the INEEL. In its approximately 50 years of existence, the site was managed by a large number of independent commercial contract managers. In 1994, in an effort to consolidate management of the site, the Department of Energy contracted for the first time for management of the INEEL with one private organization–Lockheed Martin Corporation. Prior to that time, segments of the site had been under simultaneous management by five private contractors. Through consolidation of the operating contracts into one manager relationship, it was hoped that economies of scale could be gained. In addition, the Department of Energy, the Department of Defense, and the Defense Nuclear Facilities Safety Board (DNFSB) hoped to improve the safety profile of the site, its employees and the environment.

> The DNFSB is not a regulatory agency and is not a function of the DoD. Under its enabling statute (Public Law 100-456), the Board is responsible for independent, external oversight of all activities in DOE's nuclear weapons complex affecting nuclear health and safety. The Board reviews operations, practices and occurrences at DOE's defense nuclear facilities and makes recommendations to the Secretary of Energy that are necessary to protect public health and safety. In the event Board reviews disclose an imminent or severe threat to public health and safety, the Board is required to transmit its recommendations directly to the President, as well as to the Secretaries of Energy and Defense. Review about the DNFSB at this link: http://www.dnfsb.gov/ (S. A. Hawke, personal communication, October 25, 1999).

INEEL believed that it could accomplish this through consolidated safety, health and environmental compliance procedures using the considerable combined expertise of the scientists, engineers, operations management, craft employees, managers and consultants affiliated with the INEEL.

In July of 1997, information technology professionals, employees of energy contractor Lockheed Martin at the Idaho National Engineering and Environmental Laboratory, were faced with a daunting challenge. The Defense Nuclear Facilities Safety Board , a Department of Defense oversight committee with congressional reporting responsibility, mandated that Lockheed Martin implement a networked systems-based work order management solution. The mandate stipulated that the system provide a definitive assurance that all applicable regulatory requirements were met by over 6,000 employees of the nuclear waste storage and management facility. Such compliance requirements included federal environmental and energy laws, safety and health requirements, specific nuclear provisions of the Department of Energy and the Department of Defense, other federal regulations, applicable state and local requirements, and other standards of performance of the Department of Energy and the INEEL itself.

Over a period of several months, content professionals, scientists, engineers, and construction and maintenance specialists were able to document approved methods of meeting the site-wide requirements of the DNFSB, but there was serious concern over time and manpower requirements for converting these requirements to machine-usable form. With only a couple of months left before the DNFSB deadline, IT managers were given 18-month estimates for completion of the system using conventional tools and methods. Even within this time frame, there was little enthusiasm for the project