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REENGINEERING HANFORD

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ABSTRACT

The Department of Energy Richland Operations Office is in the process of reengineering its Hanford Site operations. There is a need to fundamentally rethink and redesign environmental restoration and waste management processes to achieve dramatic improvements in the quality, cost-effectiveness, and timeliness of the environmental services and products that make cleanup possible. Hanford is facing the challenge of reengineering in a complex environment in which major processes cuts across multiple government and contractor organizations and a variety of stakeholders and regulators have a great influence on cleanup activities. By doing the up-front work necessary to allow effective reengineering, Hanford is increasing the probability of its success.

INTRODUCTION

With the disintegration of the Soviet Union and the end of the Cold War, the mission of the Department of Energy's (DOE's) Hanford Site has changed from Defense Production to Environmental Restoration and Waste Management. The 560-square-mile Hanford Site in South Central Washington State was established in 1943 as part of the Manhattan Project. Only five years elapsed between the time plutonium was discovered at the University of California in 1940 and the delivery in 1945 of the first Hanford-produced plutonium to Los Alamos for use in the Trinity Test and, ultimately, for use in the "Fat Man" atomic bomb dropped over Nagasaki, Japan. During that five-year span, the Hanford Site was built; some fifty thousand people were hired, trained, and put to work; and nuclear material production was underway. After five decades of nuclear material production for the national defense, the predominant mission of the Site changed in early 1988 with the announcement that plutonium would no longer be manufactured.

Today, the Hanford Site, roughly the size of Rhode Island, contains over 1000 buildings, 564 miles of roads, 169 miles of railroad, four fire stations, extensive water and power utilities, two libraries, and a computer system valued at more than $32 million.

A Need for Change

Hanford is changing because circumstances in the world have changed and the direction of change at Hanford is being influenced by a number of factors. After decades of supporting America's defense programs, Hanford has turned its sights on the immense job of cleaning up contaminated material and facilities created and compiled over a 50-year period. Over $1 billion tax-payer dollars were spent in 1992 on waste management and environmental restoration, and the cleanup at Hanford has been projected to cost $57 billion over the next 30 years.

At the same time, the nation is grappling with the problem of reducing its budget deficit and government agencies are experiencing significant pressure to cut costs and reduce spending. The

myriad of stakeholders concerned with the future of Hanford are calling for quicker and more thorough clean up of the site. An accelerated clean up, though, presents a concern for the future economic viability of the region; the Hanford Site provides 45 percent of the total income in the local community.

A Vision for the Future

A number of different views about future Hanford Site use are held by competing interests, such as agricultural, ecological, and tribal interests. These competing interests generate a complex set of interrelated issues that often appear contradictory. In spite of differences of opinion about the details, a shared vision of the future for the Hanford Site and the region with which it is associated has been developed.

The Hanford vision is that a partnership of state and local government, regional economic development agencies, labor, industry, and other stakeholders will create a clean, accessible, and healthy environment. This partnership will be part of a prospering and diversified community able to compete effectively in high-technology national and international environmental services markets.

REENGINEERING FRAMEWORK

Achieving this vision will require fundamental changes in the way Hanford is managed and operated. It will require dramatic improvements in the way Hanford proceeds to accomplish its new three-fold mission of cleanup, science and technology development, and economic diversification, and what amounts to a paradigm shift in the culture of the site. There is a need to fundamentally rethink and redesign, that is, to "reengineer" Hanford environmental restoration and waste management processes to achieve dramatic improvements in the quality and cost-effectiveness of the environmental services and products that make cleanup possible. This section describes a framework for reengineering to facilitate discussion of some of the activities taking place within Hanford's reengineering effort.

Several methodologies for reengineering have been presented in the literature (Hammer and Champy [1]; Davenport [2]; Reeves and Torrey [3]; Mundt [4]). The following framework combines ideas and concepts from these methodologies with our own ideas developed through a number of years of experience in significant change interventions in government organizations. The framework is intended to guide an organization through a successful reengineering effort. The framework consists of three high-level phases: orient, plan, and implement. As shown in Figure 1, each phase consists of several steps and is supported by three continuing support activities. These continuing activities are performance measurement, program management and integration, and change management. Performance measurement activities help keep the focus on the critical improvement objectives. Program management and integration activities coordinate the complex reengineering activities. Change management activities help the organization adapt and accept the major changes that reengineering brings. These support activities continue through the entire reengineering effort, although their content changes during each phase. The following discussion provides an overview of the phases, the steps within each phase, and the supporting activities for each step.

Phase 1: Orient

During this phase the reengineering effort is initiated. A proper beginning goes a long way towards a successful reengineering effort, since dedication and conviction will be required to maintain energy and commitment during the effort.

Step 1 - Establish the Effort - The organization's mission and environment are examined to determine the current situation and whether reengineering is an appropriate strategy. Performance measurement activities in support of this step define the level of improvement required by assessing customer and stakeholder needs, external drivers and constraints, current performance, and required performance. Program management activities identify program objectives. Change management activities assess readiness for change by examining organizational culture and history and the perceived need for change by key players and the process participants who must ultimately redesign and implement new processes

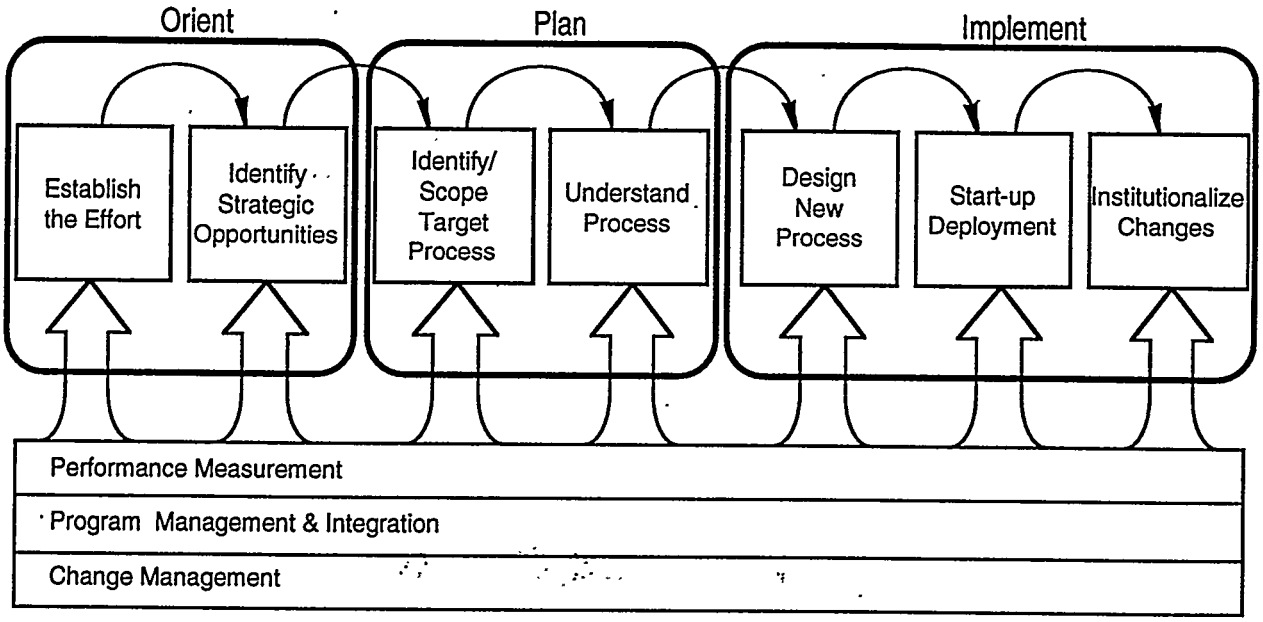

Figure 1. Reengineering Framework

and ways of doing business. The support activities undertaken in each step are summarized in Table 1, and will no longer be specifically addressed in the text. At the end of this initial step, there should be a clear understanding that reengineering should be pursued.

Step 2 - Identify Strategic Opportunities - The reengineering effort determines the critical success factors that will allow the organization to reach required levels of performance. A business model is developed to provide an organizational perspective. Processes that have a significant impact on organizational performance are identified. Target processes are selected based on their potential for impact and improvement.

Phase 2: Plan

With the need for reengineering established and strategic opportunities identified, the reengineering effort must be planned. Careful management and coordination are required since reengineering is a major initiative, consuming significant resources, intent on making drastic changes in an organization's structure and way of life.

Step 3 - Identify and Scope Target Processes - The required improvements for the target processes are defined. Potential risks and resource requirements for reengineering the target processes are identified. Internal and external constraints on the process are considered to determine an appropriate scope for reengineering.

Step 4 - Understand the Process - Each target process is modeled at a high level to ensure common understanding and determine true process requirements. Subprocesses and key interfaces are identified. The reengineering effort for each target process is planned.

Phase 3: Implement

During this phase, reengineering teams go to work on each target process, with their efforts being coordinated at an organizational level.

Step 5 - Design New Process - Alternative designs for the process are generated using reengineering and design tools. Designs are evaluated and compared, with a new design being selected and demonstrated through prototyping.

Step 6 - Startup Deployment - The process is piloted for observation and validation. Performance from pilot processes and feedback from participants and customers result in design modifications.

Step 7 - Institutionalize Changes - The required infrastructure to support the new process

Table 1. Support Activities in Each Step of the Reengineering Framework

Step	Performance Measurement	Program Mgmt & Integration	Change Management
Establish the Effort	• Define level of improvement required	• Identify program objectives	• Assess readiness for change
Identify Strategic Opportunities	• Define critical performance gaps	• Define program scope	• Identify sponsors • Define common vision
Identify/Scope Target Processes	• Define current process performance	• Prioritize projects • Create project plans • Select reengineering leaders	• Form steering committee • Develop sponsorship • Communicate need for change
Understand Processes	• Establish process performance target	• Balance scope of redesign efforts	• Form project team • Identify process owner
Design New Processes	• Estimate expected process performance and benefits	• Identify supporting requirements • Identify pilot areas	• Educate on technology enablers • Educate on organizational enablers
Start-up Deployment	• Evaluate pilot results	• Create implementation master plan	• Communicate success
Institutionalize Changes	• Measure new performance	• Share project lessons with others	• Implement continuous improvement

is developed. Organizational structures are modified and incentives revised. Key interfaces with other processes are carefully managed. The process is implemented across the organization.

REENGINEERING HANFORD

The preceding section presented a framework for a complete reengineering effort. Efforts to reengineer key processes at Hanford are underway, but far from complete. This section describes examples of activities happening at Hanford in terms of the reengineering framework.

Establishing the Effort

As discussed in the introduction of this paper, Hanford has a need for change. The challenge of getting the cleanup done faster and cheaper will require major changes in the way work is done at Hanford. The need for reengineering at Hanford is clear. However, Hanford is a complex environment. Major processes cut across multiple government and contractor organizations and a variety of stakeholders and regulators have a great influence on cleanup activities. In this situation, a high-level focal point for site-wide reengineering efforts is important.

In September of 1994, the DOE's Richland Operations Office (DOE-RL) established the Office of Economic and Strategic Transition and Integration (EST) and within it, the Strategic Transition Initiatives Division (STI). EST was established to help strategically integrate efforts to improve performance at Hanford and diversify the local economy. As a key division of EST, STI has become the focal point for efforts to reengineer Hanford. The efforts of STI will be key to achieving the significant cost-savings agreed to in the Hanford Federal Facility Agreement and Consent Order between the DOE, the U.S. Environmental Protection Agency, and the Washington State Department of Ecology.

Efforts to reengineer Hanford are guided by the Hanford Strategic Plan, which contains a number of goals for the Site. The Manager of DOE-RL has established "Goal Champions" and given them the responsibility and authority to ensure that strategic goals are being actively pursued. Staff of STI support the Goal Champions in this effort and work with them to ensure that reengineering and process improvement initiatives are focused on achieving Hanford strategic objectives. In many cases, the Goal Champions become the "process owners" for cross-cutting reengineering efforts.

Identifying Strategic Opportunities

Hanford is using a dual-approach strategy for identifying processes as reengineering targets. One approach is a bottoms-up approach, in which ideas for targeted reengineering efforts are generated by a number of sources. For example, input is welcomed from anyone at Hanford, and a number of process targets have been suggested. Another example is DOE's recent Standdown, an activity in which senior DOE-RL managers stopped work for a day to concentrate on identifying what needs to be fixed. Among the ideas generated by the Standdown were a number of target processes. As could be expected, many of these bottoms-up ideas are fairly specific and limited in scope. They often focus on improvements in a functional area, as opposed to cross-cutting processes. As a result, Hanford is employing a parallel top-down approach to identify reengineering targets.

The purpose of the top-down approach is to identify the key processes that have the greatest impact on Hanford's cleanup mission accomplishment and to determine which of these processes offer the greatest potential for improvement. Identifying target reengineering opportunities requires an assessment of various types of performance data for these processes. This type of data can be difficult to obtain because management and accounting systems are geared to functional work breakdowns, rather than being mapped into processes. This is the reason for Hanford's Resource Map Analysis (RMA).

The RMA is an attempt to gather both candidate processes and the data needed to confirm and prioritize reengineering targets. The output of the RMA is an overall picture of the Hanford Site cleanup in terms of where resources (manpower, dollars, and time) are really being expended. This shows where real payoff in time or cost reductions can be found. RMA is based on concepts promoted by The Boston Consulting Group [5] and on activity based-cost accounting principles

(for a discussion of activity-based cost accouting, see Brimson [6]).

A Resource Map is a high-level diagram that shows all of the processes necessary to produce a product (see Figure 2). It is based on the notion that necessary processes can be grouped into four categories. The Execute process is comprised of

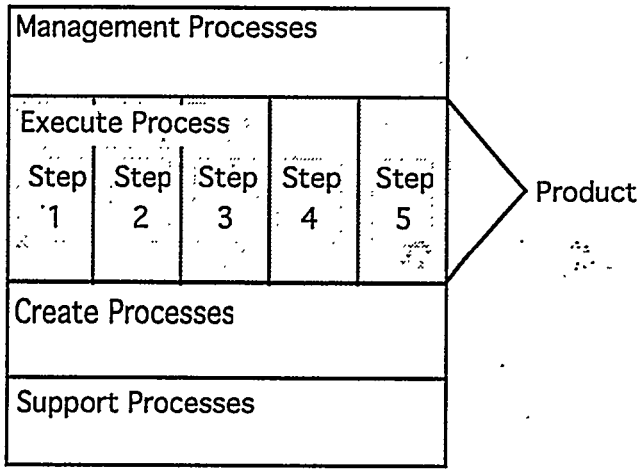

Figure 2. Resource Map

the major steps needed to produce the product. The Manage processes are those that are required to ensure the product is made properly, on time, and on budget. Support processes provide on-going support and internal products to the Execute process. Create processes develop the capabilities--buildings, equipment, people skills--necessary to make the product.

The RMA starts by identifying and describing at a very high level the primary cleanup processes at Hanford. The overall resources spent on each process are then determined and placed on the resource map. This data generally comes from budgets and head counts, and represents the resources directly assigned to execution, management, create, and support processes. However, many resources designated for executing the primary process are often used in management, create, and support processes. For example, engineers may spend a significant amount of time waiting for work authority and documenting actions taken. These activities, which consume resources that could be used for producing the product, are driven by the need to minimize risk, and are thus management activities. To show the impact of these activities, resources are reallocated to the other three process categories, as shown in Figure 3. This reallocation is done using easily accessed indicators, such as job classifications. Management estimation also plays a part. This is not a rigid accounting exercise, but an attempt to

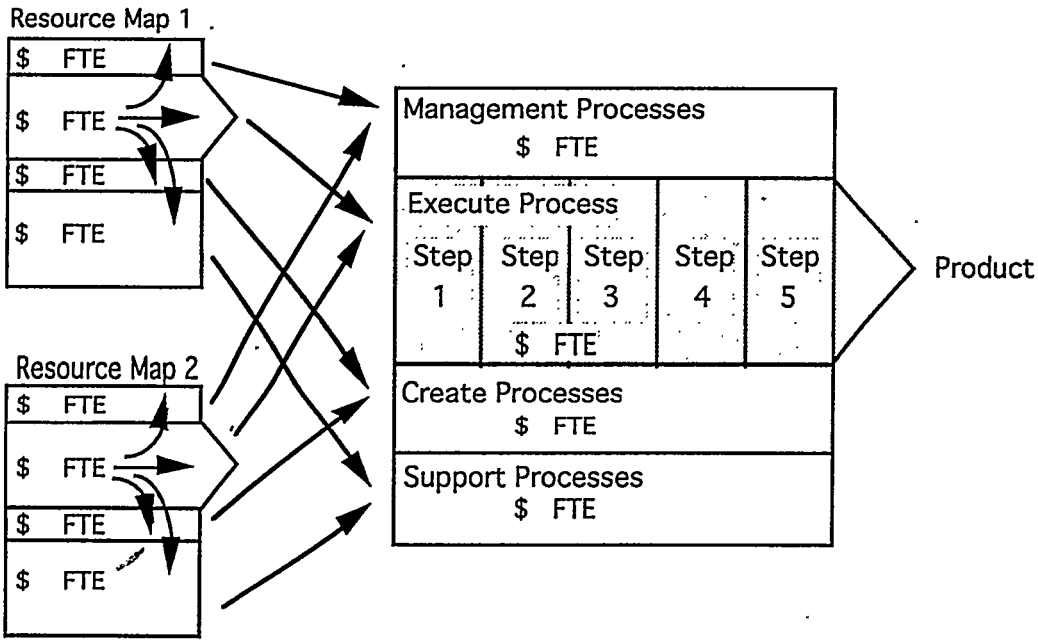

Figure 3. Resource Map Reallocation

quickly estimate resource consumption to evaluate areas with improvement potential. As shown in Figure 3, the resource maps from different primary processes can be rolled up to give a site-wide picture.

CHALLENGES

To date, most experience with reengineering, and certainly that most widely discussed in the literature, deals with single organizations, generally private sector corporations. Hanford is an operation involving multiple government and contractor organizations. The DOE "owns" the three-fold Hanford mission, but a number of private corporations are contracted to perform the work necessary to accomplish the mission. In addition to the DOE, numerous government agencies impose controls and compliance requirements on Hanford operations and processes. There are a myriad of stakeholders for Hanford and identification of the "customers" for Hanford's "primary value chains" is not always straightforward.

Finding a suitable substitute for the private sector's "bottom line" focus is a significant challenge. The DOE is not operating Hanford to make a profit for its shareholders. It is operating Hanford to satisfy the requirements and expectations of taxpayers and stakeholders and their bottom lines can vary dramatically. This greatly complicates the decision-making process. Establishing priorities is more difficult and determining the desired end state for cleanup processes is complex and time consuming.

Another challenge for reengineering within government is a budgeting process that "fences" money in ways that discourage the kind of cross-function, cross-program redesign that is often crucial to breakthrough improvements. When you combine these budgetary constraints with a rigid procurement system, you can end up with gridlock when it comes to such alternatives as outsourcing.

Hanford is a unique reengineering challenge that requires an innovative, adaptable approach. The trick is to manage the reengineering effort in a way that recognizes Hanford as a "virtual enterprise," (Davidow and Malone [7]) for, indeed, this is what Hanford is. The key is to identify the socio-technical links that create this virtual enterprise and exploit them to achieve the synergy necessary for successful reengineering.

In order to sustain the level of effort necessary to successfully complete the Hanford cleanup, dramatic improvements in the performance of cleanup at Hanford is essential. Reengineering is seen as an effective way of accomplishing these performance improvements. By doing the up-front work necessary to allow effective reengineering, Hanford is increasing the probability of its success.

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BIOGRAPHICAL SKETCH

Richard V. Badalamente is a Senior Program Manager in the Technology Planning and Analysis Center of Pacific Northwest Laboratory (a) in Richland, Washington. Over the last year and half Dr. Badalamente has been leading the Laboratory's reengineering efforts in support of the Department of Energy's (DOE's) Hanford Transition program. He is currently assisting the DOE Richland Operations Office Strategic Transition Initiatives Division in strategic planning for reengineering. Dr. Badalamente holds PhD and MS degrees in Industrial Engineering from Texas Tech and a BS in Aeronautical Engineering from the University of Southern California.

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Russel E. Rhoads is a Senior Program Manager in the Technology Planning and Analysis Center at Pacific Northwest Laboratory. He has held a variety of line management and program management positions since coming to the lab in 1975 and has contributed to many large, interdisciplinary research programs. He is currently leading the Laboratory's programs to improve the performance of operating facilities and large administrative functions in the federal government. He holds a BS in Physics and an MS in Nuclear Engineering from the University of Washington.

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