Industrial Engineering

Industrial engineers are concerned with problem-solving applications. Our engineering staff is experienced in performance measures and standards, research of new products and product applications and ways to improve use of scarce resources. We are integrators who combine all aspects of a problem or a proposed solution into one final working entity.

Techniques practiced by our industrial engineers include process analysis, operational optimization, quality analysis and control, cost analysis and estimates and user satisfaction. We develop these systems for all components of the development life cycle, including concept development, requirements analysis, design, implementation, acceptance and maintenance.

Areas of Emphasis

Industrial engineers strive to improve the entire process, whether in a manufacturing or service environment, by providing:

- Business, industrial and manufacturing process reengineering
- Resource planning and optimization
- Technology development
- Ergonomics
- Reliability and risk assessment
- Cognitive engineering and analysis

Methods and Tools

Management control systems serve as a "start-to-finish" tool, beginning with financial planning and cost analysis. Design production planning and control systems coordinate activities and product quality. These techniques lead to improved design systems for the physical distribution of goods and services.

Documentation tools are used in the early stages of the system life cycle to understand the system under study and to document the new or redesigned processes. Resource planning tools are used to ensure system resources are effectively engaged.

Mail can be a convenient tool for terrorists to transport radioactive material across international borders. PNNL, along with the U.S. Bureau of Customs & Border Protection, is working toward being able to scan each piece of international mail and every parcel that enters the United States for radioactive contents. Staff have been installing passive devices directly over conveyor belts or adjacent to dock doors to automatically screen items being processed for delivery.

Tools and techniques used by the Operations and Process Transformation staff include:

- Process analysis
- Capacity planning/resource planning
- Cost estimating
- Equipment requirement analysis
- Engineering economics
- System reliability analysis
- Failure modes and effects analysis
- Staff assessment
- Integrated definition modeling
- Object-oriented modeling
- Queuing analysis

About Pacific Northwest National Laboratory

Pacific Northwest National Laboratory is a U.S. Department of Energy Office of Science research facility that delivers breakthroughs in the areas of environment, energy, health, fundamental sciences and national security. Battelle, based in Columbus, Ohio, has operated PNNL since 1965. PNNL is located in Richland, Washington, and has an annual business volume of more than $700 million and more than 3,800 employees.

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Pacific Northwest National Laboratory
Operated by Battelle for the U.S. Department of Energy

Operations and Process Transformation

SCIENCE TO SOLUTIONS *for National Security*

Improving Business Processes

The Operations and Process Transformation Group at Pacific Northwest National Laboratory offers a wide range of capabilities that provide government and private clients with effective methods for improved performance. From incremental improvements to transformational changes, we tailor approaches that maximize benefits and minimize disruption and anxiety.

Key to our approach is developing integrated solutions that take into consideration the interdependencies among work flow, best use of technology, organizational culture and skills and staff expertise. Our goal is to improve business processes and ultimately reduce the bottom line.

Forming a Partnership

Improving business processes is a team effort. We bring the expertise and tools, and our clients provide the detailed knowledge of their strategic direction, current processes and organizational culture. Although our staff can act as change agents, the client must be willing to do the hard work of putting into practice new and improved ways of doing business.

We begin our partnership by reviewing the client's current strategies and identifying areas of the organization that have the most critical improvement needs. From this foundation, we identify effective performance measures. We follow through with modeling and potential improvement methods.

Tapping into Our Toolbox

Unlike many firms that offer only a narrow set of capabilities in organizational and operational process redesign, PNNL applies multidisciplinary teams to solve problems. Our teams are composed of:

- Industrial engineers
- Management systems specialists
- Organizational design experts
- Logistics management specialists
- Operations research systems analysts
- Legal and regulatory analysts

Our wide-ranging expertise is complemented by the use of continuous process improvement techniques, including:

- Process mapping
- System modeling and simulation
- Regulatory constraint analysis
- Benchmarking
- Organizational design
- Science and technology assessment
- Training knowledge and skills development

Delivery

Organizations are constantly changing, and we have assisted in undertaking many types of transitions – from major mission changes to "fine tuning" adjustments. Process improvement has been applied on the factory floor, in the laboratory, in the board room and in the field. We provide on-site expertise where it is needed most.

Organizational Effectiveness

Our staff applies principles of human behavior in group and organizational settings to assist clients with developing and maintaining more effective and efficient working environments, organizations and enterprises. We assist organizations with advancing or regaining effectiveness during periods of transition. We begin by assessing mission or business objectives, desired critical outcomes, system processes and a variety of socio-economic and organizational culture factors to devise strategies for success.

Areas of Emphasis

We assist clients with integrating strategic planning, knowledge management, performance assessment and design interventions to address leadership and management issues through the following capabilities:

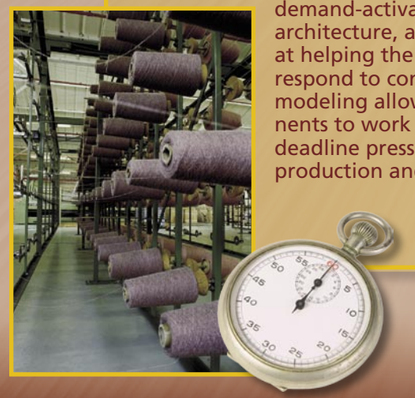
- Strategic planning
- Leadership development
- Institution and team building
- Culture change/change management
- Knowledge management systems design
- Performance measurement and assessment

Methods and Tools

We interact directly with our clients, their staff and customers to determine the best path to optimize organizational effectiveness with the following:

- Workforce analysis
- Jobs task analysis
- Resource analysis
- Life cycle costing

PNNL played a major role in helping the textile industry find the best ways to implement demand-activated manufacturing architecture, a new concept aimed at helping the industry more quickly respond to consumer needs. This modeling allowed industry components to work together to reduce deadline pressure and shorten the production and distribution process.



Supporting national security efforts, PNNL professionals provide training programs through complex scenario-based live, virtual and constructive exercises for military operations such as the Navy's Center for Asymmetric Warfare. Training programs such as this maximize learning opportunities with experienced instructors and state-of-the-art facilities.

Training and Learning Technologies

Staffed with training professionals, the Operations and Process Transformation Group applies a proven methodology to the analysis, design, development, implementation and evaluation of training programs and products. We assist clients by providing training programs that are focused on successfully learning new strategies and skills. Highly successful programs have been managed by the laboratory for both domestic and international students.

Areas of Emphasis

Our qualified and experienced instructors can manage complete programs or assist clients in a specific training emphasis such as:

- Instructional design
- Course management
- Cognitive analysis

Methods and Tools

Whether in the field, in the office or at a specialized training center, we provide state-of-the-art training capabilities through:

- Course design
- Course management
- Distance learning methodologies
- Program evaluation
- Mock-up facilities and training aids
- Performance testing
- Computer-based interactive multimedia training systems

Operations Research and Systems Engineering

The Operations Research and Systems Engineering application area combines our expert knowledge of complex logistics systems with an experienced background in organizational, management science and operational dynamics.

We use techniques and approaches in systems analyses, manufacturing engineering and logistics support analysis. We focus on results for government and industry that improve system reliability, effectiveness and efficiency.

Across a broad spectrum–from military command and control to commercial enterprise–we focus on the decision-making process, identifying the impact of decisions and enhancement opportunities. We model the decision process, analyze risks, apply operations research methods to assess optimality and employ probability and statistics to address uncertainty.

Areas of Emphasis

Combined with the other application areas within the Operations and Process Transformation Group, the Operations Research and Systems Engineering area provides a powerful problem-solving resource for business and government through the following:

- System requirements analysis
- Decision-making modeling
- Policy analysis and organizational impacts analysis

Methods and Tools

The Operations Research and Systems Engineering staff are engaged in a wide range of activities, from issues such as top-level strategy, planning, forecasting, resource allocation and performance measurement to scheduling, systems, supply chain management and analysis of data in large databases by providing:

- Integrated logistics planning and execution
- Strategic planning and tactical execution analysis
- Decision theory
- Organizational and strategy analysis
- Performance measurement and evaluation linear programming
- Transportation systems analysis
- Design of experiments
- System modeling and simulation
- Statistical analysis

Reducing the Army's logistics-forward footprint and increasing responsiveness is essential to its transformation into a rapid-response force. PNNL effectively integrated the strategic planning efforts of 16 Army organizations and more than a dozen contractors by developing the Common Logistics Operating Environment–an integrated capability that reports combat readiness, provides logistical situational awareness and common business processes.