Case Study

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Stories of people thinking in good ways about organizational excellence.

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CONINUOUS IMPROVEMENT FOR LEADERS AND MANAGERS
Introduction to the Winter issue of the Journal of Innovative Management

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Case Study

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- Cope with the growing need to integrate quality management, systems applications, and creativity and innovation into their organization dynamics
- Integrate academic thought with real-world applications
- Cope with learning time pressures by using an article format that enables faster reading and improved initial learning
- Facilitate a sense of community as readers see how people from various organizational settings and sectors face and solve what are essentially common leadership and managerial problems
- Achieve performance excellence throughout the organization.

The Journal of Innovative Management publishes articles that fall into the following matrix of categories:

- Case studies, applied research, tools, leadership perspective, and news & views
- Organizational transformation; participative planning, problem solving, and innovation; process design, management, and improvement
- Private sector, public sector, and non-profit organization settings
- Leading-edge and experience-based information, generally 1–3 years old.

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Continuous Improvement for Leaders and Managers

A basic tenet of quality management is that leadership must attend to working in the system, and to working on the system, in a participatory-management style. One system that corporate leadership needs to be knowledgeable about and devote some attention to improving—because it directly affects their ability, and the ability of their employees, to work successfully in their own organization—is the economic system that their organization operates in. This need for collaboration and common-good cooperation is not typically recognized, however, as a result of a strong academic and political bias against participative management between and among social system leaders. But that sort of system blindness or arrogance may be starting to soften as a result of the complexity and difficulty of globalization.

The International Society for Ecological Economics (ISEE) is dedicated to advancing understanding of the relationships among ecological, social, and economic systems for the mutual well-being of nature and people. ISEE states that:

Ecological economics exists because a hundred years of disciplinary specialization in scientific inquiry has left us unable to understand or to manage the interactions between the human and environmental components of our world. While none would dispute the insights that disciplinary specialization has brought, many now recognize that it has also turned out to be our Achilles heel. In an interconnected evolving world, reductionist science has pushed out the envelope of knowledge in many different directions, but it has left us bereft of ideas as to how to formulate and solve problems that stem from the interactions between humans and the natural world. How is human behavior connected to changes in hydrological, nutrient or carbon cycles? What are the feedbacks between the social and natural systems, and how do these influence the services we get from ecosystems? Ecological economics as a field attempts to answer questions such as these. (http://www.ecoeco.org/)

Homo sapiens is at another turning point in its relatively long and (so far) inordinately successful history. Our species’ activities on the planet have now become of so large a scale that they are beginning to affect the ecological life-support system itself. The entire concept of economic growth (defined as increasing material consumption) must be rethought, especially as a solution to the growing host of interrelated social, economic, and environmental problems. What we need now is real economic and social development (qualitative improvement without growth in resource throughput) and an explicit recognition of the interrelatedness and interdependence of all aspects of life on the planet. We need to move from an economics that ignores this interdependence to one which acknowledges and builds upon it. We need to develop an economics that is fundamentally ecological in its basic view of the problems that now face our species at this crucial point in its history. (http://www.eoearth.org/article/An_Introduction_to_Ecological_Economics_Chapter_1)

The basic points of consensus in the ecological economics vision are:

1. The vision of the earth as a thermodynamically closed and nonmaterially growing system, with the human economy as a subsystem of the global ecosystem. This implies that there are limits to biophysical throughput of resources from the ecosystem, through the economic subsystem, and back to the ecosystem as wastes.

2. The future vision of a sustainable planet with a high quality of life for all its citizens (both humans and other species) within the material constraints imposed by 1.

3. The recognition that in the analysis of complex systems like the earth at all space and time scales, fundamental uncertainty is large and irreducible and certain processes are irreversible, requiring a fundamentally precautionary stance.

4. That institutions and management should be proactive rather than reactive and should result in simple, adaptive, and implementable policies based on a sophisticated understanding of the underlying systems which fully acknowledges the underlying uncertainties. This forms the basis for policy implementation which is itself sustainable. (http://www.eoearth.org/article/An_Introduction_to_Ecological_Economics_Chapter_3)

The leadership issue we all face is knowing that everything affects everything else in small or large ways, and it is important for ourselves and everyone else that we accept our responsibility and accountability for the operations and interactions within and among the systems that we lead, manage, work in, and live in.
Continuous Improvement for Leaders and Managers at Work

A Baldrige National Quality Award winning company, DynMcDermott Petroleum Operations is a privately held corporation that holds the Maintenance and Operations contract for the Strategic Petroleum Reserve of the Department of Energy. Its stated mission is to excel at delivering safe, secure, environmentally responsible and cost effective SPR operational readiness.

Robert McGough, President and CEO, begins our case study of this award-winning organization by telling us something about their idea of leadership:

Our leadership style can best be described by the answers to six questions, which provide a common foundation for the DynMcDermott team:

• Who are we? (Our values)
• What do we do? (Our mission)
• Who do we do it for? (Our customers)
• How do we do it? (Our processes)
• How well do we do it? (Our performance metrics)
• How do we know it? (Our feedback mechanisms)

Our values determine who we are. We understand our mission, identify with our customer (the Department of Energy), and use our processes, metrics, and feedback mechanisms to achieve our goals.

This system didn’t fall into place overnight. It took us about ten years to get where we wanted to be, and we continue to strive to improve. By focusing on feedback from our customer, our employees, and outside sources such as the Malcolm Baldrige examiners, we have strengthened our commitment to continuous improvement.

In the article, Open Source Your Innovation, Jeff DeGraff, a professor at the University of Michigan, and doctoral candidate Pete Bacevience, apply the concepts of open source to improving innovation. They tell us:

Open source has gained popularity due to its versatility. Its roots stem from the computer industry where programmers openly shared code in order to develop, de-bug, and improve software. The philosophy behind open source is that it is a combination of community building and competency building.

The creation of knowledge—and thus the development of new innovations—resides within the variety of social networks that exist around us. Open source innovation might be a virtual network or a literal network of product developers, customers, users, etc. that share information and resources to create breakthrough innovations or to make incremental improvements to existing innovations.

Manufacturing the Solutions, by L. Hunter Lovins, the President and Founder of Natural Capitalism Solutions, is drawn from her keynote presentation at the Association of Manufacturing Excellence (AME) annual conference, in November, 2007. In speaking to leaders of business and industry, Hunter begins with:

As business and industrial managers, you may think of what you do as a job. I see it as essential to the survival of life on earth. Creating innovative and sustainable ways to make the things we need and deliver the services we want is going to determine whether or not we survive as a species. Governments won’t give us the answers: we need solutions at the speed of business.

Sustainability pays. The companies on the Dow Jones Sustainability Index are outperforming the general market. Goldman Sachs released a report in 2007 showing that the companies that are the leaders in environment, social, and good governance policies have 25% higher stock value. Almost 90% of CEOs from most of the world’s developed countries think sustainability is a key to their profitability and will be an even more important issue five years from now.
Leadership

Robert E. McGough, President & CEO of DynMcDermott—DynMcDermott Petroleum Operations Company is under contract to the Department of Energy to manage and operate the strategic petroleum reserve, which consists of four operating sites in Louisiana and Texas. We store almost 700 million barrels of crude oil. At today's values, we're therefore responsible for safeguarding more than $55 billion in oil for the US government and related storage facilities. We do this with approximately 520 dedicated and trained professionals.

A lot of people over the years have had a lot to say about leadership.

“Management is doing things right; leadership is doing the right things.” —Peter Drucker

“To succeed in this world, you have to change all the time.” —Sam Walton (Wal-Mart)

“There is nothing wrong with change as long as it is in the right direction.” —Winston Churchill

“Extraordinary people do extraordinary things in extraordinary times.” —Bob McGough

Peter Drucker's differentiation between leadership and management is the key to DynMcDermott's approach. In fact, we have a formal training program we call Managers to Leaders, which trains our managers to do the right thing. We also ascribe to both Walton and Churchill's philosophy of change by focusing on continuous performance improvement. The last quotation can't be attributed entirely to me, but it sums up my reaction when asked about our performance during Katrina and Rita.

DynMcDermott's mission: To excel in delivering safe, secure, environmentally responsible, and cost-effective Strategic Petroleum Reserve operational readiness.
DynMcDermott’s vision: To be the industry leader for petroleum storage, distribution, and operations best practices; and to assist the Strategic Petroleum Reserve in remaining a leader in federal government agency performance.

The implementation of our strategic plan is focused on the guiding principal of: “Safe and Secure Energy,” which is defined by the core values and strategies under which we operate. DynMcDermott’s core values and success factors, aligned with the Department of Energy’s core values and success factors, are generated to further define the implementation of the strategic plan. From those success factors, we identify our strategic objectives, strategies, and performance indicators, targets, and goals. These form the foundation for our annual planning. Performance indicators are assigned to each strategy and are the basis for development of the DM annual performance plan. Progress against these targets is monitored and reported to the DOE. Figure 1 shows DynMcDermott’s core values and their related success factors.

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We face several business case issues unique to our position and industry:

We live in unprecedented times. Twenty-five years ago, uncertainties about the availability of crude oil supplies created the need for the Strategic Petroleum Reserve (SPR). These uncertainties still exist today, due to political situations as well as natural catastrophes. Our role as the management and operations contractor for strategic petroleum reserves requires us to be ready to respond under any conditions or circumstances. Leadership must be attuned to this business case, and be prepared to
perform, whatever may face our nation.

As you can imagine, those of us living in the Gulf Coast areas of Louisiana and Texas and Mississippi have been faced with many business and personal challenges as a result of Hurricanes Katrina and Rita. More than 50% of our employees were displaced from their homes, and many are still recovering from hurricane damage to this day. Food service and living accommodations were severely restricted at the time of the storms, and still present a problem when we travel to our remote sites. Despite this environment, we have remained focused on our mission performance.

Our people really matter. They are our most important resource.

Success mentality is our only option. Our actions and processes are designed and executed with this in mind.

Everyone in this country is one of our stakeholders. Our stakeholders range from the person reading this article to major oil companies to the United States Government. Stakeholder interests tend to peak when newspapers run stories about the potential for important supplies being affected by political situations in the Middle East, or by a storm in the Gulf of Mexico. Our nation runs on crude oil, and storms or other disruptions have an economic impact on all of us.

Changing technology has affected us dramatically. Control systems, computer upgrades, and other technology advances have allowed us to become more efficient and to reduce costs.

We are a government contractor. The environment in which we operate as a government contractor is unique. We have but one customer, and our contract limits us exclusively to the Department of Energy Petroleum Reserve. We therefore have the luxury of owning 100% of our relevant market share.

Our leadership approach is consistent with Malcolm Baldrige culture. Senior leaders set and deploy organizational vision, values, and performance direction through our values-based strategic planning process. Senior leaders understand the need to conduct open and frank communications on a continuous basis, to create and balance value for all stakeholders, and to foster an organizational bias for action.

What does our leadership define as the keys to performance success? We take the long view, by focusing on the future. It is generally too late to change what is happening today, so we have shifted our attention to the future, and that which we can impact. We also have demonstrated dedication from the top of the organization to continuous improvement and innovation. Another key is the environment created by senior management, which empowers employees, provides agility, and offers an opportunity for learning.

Our quest for excellence starts with our strategic planning process, which includes employees at all levels, our key suppliers, and our partners. We have also deployed a values-based planning process, in which our senior leaders set and deploy the organization’s vision, values, and performance direction, again based on customer orientation and values assessment. We align, link, and integrate our key processes,
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and track our successes and progress using more than 1,200 measures. Our results are evaluated, and we provide continuous feedback to our employees, customers, and partners to close the loop.

The architecture for DynMcDermott’s quest for excellence includes an improvement culture based on Total Quality of Management theory, the PDSA (Plan Do Study Act) model, the Baldrige principles, and other quality tools and techniques.

We review our performance through regular and redundant communication methods, utilizing a dashboard performance measurement system called pbViews, and we interface intentionally with our customer as well. Our senior leaders foster and reinforce this architecture by empowering employees, encouraging and rewarding initiative, promoting continuous improvement, and involving the customer in the performance excellence process, while setting clear goals and strategies for attaining excellence.

Our senior leaders’ personal actions reflect a commitment to our values, through engaging employees via a variety of communication channels, and promoting activities that examine and reinforce these values and improve performance. I participate, for example, in training for the emergency response team. I also use a monthly CEO video, all-hands meetings, staff meetings, newspapers, and the Internet to communicate throughout DynMcDermott.

All our senior leaders are trained, state-level Baldrige examiners, which demonstrates our commitment to performance improvement. Our organizational leaders use tools such as Six Sigma, performance improvement teams, benchmarking, ISO 9001, and process mapping to improve processes and performance. We currently have twenty-four Six Sigma black belts in our organization. The owners of the processes, metrics, and quality tools are our organization leaders, who also participate in our strategic planning processes, and are held accountable for their measures.

Legal and ethical behavior is a culture that’s ingrained at DynMcDermott, and we are guided by a strict code of ethics. One part of our governance system is a board of directors composed of representatives from our four stockholders. This board meets semi-annually and reviews our performance and adherence to ethical practice, as well as our governing documentation and policies. We also have a significant number of external and internal validations, including formal management reviews, internal audits, the ISO 9001 Quality Management System, the ISO 14001 Environmental Management System, and the OSHA Voluntary Protection Program.

We measure our leaders’ success in directing limited resources to achieve project goals, and then analyze the results against customer expectations. We review customer and other feedback and respond to this information. We also use periodic performance reviews from our Malcolm Baldrige-based annual vision award program, to assess each internal organization and to help determine leadership and organizational performance. And we listen to the voice of our employees through our annual employee satisfaction surveys.
How do you keep a Baldrige-winning organization moving forward after it has won the award? We avoid complacency and stagnation by continuing to promote a performance-improving environment. We annually confirm, update, and accomplish strategic objectives. We also continue to innovate, stay agile, develop and promote quality knowledge, and look for yet another hill to climb.

A key factor in our ability to move forward is the creation of a learning environment at DynMcDermott. This environment nourishes leadership, enhances employee empowerment, and creates more mechanisms through which employees can participate in the improvement process.

We take a systematic approach toward emergency preparedness and operational readiness. We develop detailed plans, annually practice them, and when the time comes, are prepared to execute them. These plans define the execution of key timed, phased actions as hurricanes approach the Gulf Coast.

In 2005, as Katrina came closer, we followed our plan and evacuated our corporate offices in New Orleans, along with the Department of Energy staff. We relocated to a predetermined emergency operations center in Beaumont, Texas, and established communications capability two days prior to Katrina reaching the Gulf Coast. (We have prearranged lodging contracts in several different locations in Mississippi, Texas, and Louisiana, and can evacuate on order to what are hopefully the safest spots.)

Within seventy-two hours of Hurricane Katrina striking the coast, all employees were accounted for. But as we were recovering from Katrina, a second hurricane, Rita, loomed in the Gulf path directly at Beaumont. We once again relocated to the east, to Baton Rouge, near our Bayou Choctaw site, and reestablished operations prior to Rita hitting the coast. Two of our field sites were evacuated before Rita hit, and both of these sites sustained substantial damage.

The SPR, despite the havoc caused by Katrina, restored all operations, processes, data, and communications systems within five days of landfall. The President then issued a drawdown order and we responded. The two sites damaged by Rita were operational within twelve days after Rita struck. The SPR delivered more than 21 million barrels of crude oil during this crisis to augment the production that was lost in the US Gulf.

I flew into our West Hackberry facility the day after Rita struck. It was completely surrounded by water. As I got off the helicopter I was greeted by the acting site director and five of his personnel, who had not yet had a chance to get back to their homes. The first thing they said was, “When do you want us be prepared to deliver oil?” There were no comments about houses being gone, families displaced, or possessions destroyed.

Among the factors that contributed to our success during these difficult times were:

- The existence of a detailed plan
- Highly dedicated employees
- A very effective, flexible organizational structure that allowed our empowered employees to make quick decisions
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• Preplanned alternate facilities and lodging
• Our demonstrated loyalty to our employees—we continued paying everyone on time. In addition, we kept everyone on the payroll, although many were not activated for the duration of the emergency.
• The example set by our leaders, who rolled up their sleeves and contributed. For example, our CFO input payroll data herself in order to make sure employees had money in the bank when they needed it.
• The financial and housing assistance that we provided to displaced employees

Strategic Planning

G. Brian Tuminello, VP and Director, Operations and Maintenance; Duane D. Johnson, Director of Security and Emergency Preparedness; and Patricia Chael, Site Mechanical Engineer, Big Hill

In 2003, when DynMcDermott began a new five-year contract with the Department of Energy, we also began working toward our goal of becoming a Malcolm Baldrige National Quality Award winner. We set a target date of 2008. Our current contract allows us to receive renewals through 2013, and it is certainly our goal to be the M&O contractor for the Department of Energy on the SPR through the year 2013.

Our strategic planning approach encompasses the following:

• Values are principles and beliefs.
• Values deal with preferences, perceptions, and judgments.
• Values drive behavior.
• Behavioral influence is the foundation of organizational culture.
• Behavior affects systems and processes produce results.

When DynMcDermott decided to earn certification in the quality management system ISO 9001, we deployed and diffused it throughout the organization, and all of our employees embraced that culture. When we worked to become certified in the environmental management system ISO 14001, that work drove many of our behaviors with regard to the way we approached hazardous chemicals and fluids and in how we dealt with the operational and maintenance processes of opening piping for maintenance work. When we worked toward OSHA certification, a voluntary protection program, we infused an organizational culture of safety first: safety for ourselves, and safety for our coworkers. All these behaviors influenced our culture and were integrated throughout the organization to make us perform better.

Our values-based strategic planning is linked to our customer’s strategic planning. Our core values become part of our strategic plan. Certainly it’s wise of us to partner with our customer, the Department of Energy, and integrate whatever its goals are into our strategic plan. We develop methods to execute this plan, using SWOT analysis and feedback from our customer.

We also look to the future to see what our customer’s and our own internal expectations are, whether those mean filling the reserve to a certain inventory level, dealing with succession planning, or improving our technology. All these expectations are

How DynMcDermott succeeded during challenging times, continued
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Strategic planning, continued

future-challenge oriented. Our value-creation processes are related to what is of value to us as a company, what underscores our principles, and what is important to our customer. And all of this wouldn't be anything if we couldn't measure it and know where we are in terms of performing against our values.

1. The leadership team sets vision, mission, and values—and high expectations. The team consists of senior leaders. All of our departments, as well as our operating sites, are represented on the team, via conference call or in person.

2. Each organization conducts its own SWOT (strengths, weaknesses, opportunities, and threats) analysis, which we combine into one organizational analysis.

3. We link our plan to the DOE secretary's annual performance agreement with the President of the United States. For instance, in 2000, the President wanted to fill the reserve to its capacity of 700 million barrels, and set a planning horizon for the end of calendar year 2005. These goals from the President flowed down to us as a contractor, and plans were set in place to fill the reserve at a certain rate on an annual as well as a daily basis. So our plans were in sync with those of the President of the United States through the secretary.

4. Leadership and all employees review our plan and provide feedback. Everybody is an integral part of the plan, and everybody has a chance to engage, comment, and provide input.

5. Leadership actions are assigned, milestones are set, and the performance scorecard is updated.

Performance evaluation

We routinely review our performance in monthly meetings. We check how we're performing against planned activities and objectives and how we're performing against our customers' expectations, as well as review any feedback we receive from our customer, and adjust or address those requirements and expectations appropriately. We also conduct an efficiency review on a monthly basis. How well are we doing in terms of fiscal responsibility? How well are we performing against established budgets? If we're off a target for a given month, what is the cause of it? What is the variance? What do we have to do to get back within our schedule and plan?

We must always remain flexible. There are many times that our responsibilities, priorities, or customer expectations change. It is important to stay agile so that we can address these changes.

Impatience gets in the way of change

How do you deal with impatience? It's difficult, because once you decide you want to make changes, you want them to happen at once. Everyone brainstorming, and comes up with ideas for how to make things better. You do an affinity diagram, put your priorities in place, and start off with half-cooked ideas, trying to make changes happen yesterday. You won't accomplish your mission that way and you probably won't carry through with the actual process to accomplish your goals.

The balanced scorecard approach tends to bring some reason to the change process. It helps you ask the right questions. Are people trained and ready to make the changes you want to have come about? Is a business process in place for internal support? Is a structure in place to allow that change to occur? Is the customer ready for it? Although the plan sounds good to you, does the customer agree? Have you put money to the plan? Do you have a process in place for obtaining the funding?
We’ve adopted a process that is somewhat similar to the hoshin approach. What we like about hoshin is that it uses a breakthrough objective. At DynMcDermott, we’re pretty well tracked into the deliverables required by the DOE. So where is our breakthrough objective, the gold goal beyond mere requirements? Are we going to be able to strive beyond just doing our daily functions? With hoshin, we label as small rocks the normal activities or daily business processes and then label as golden boulders those big objectives that we want to pull off that will really make the organization better at the end of the day or at the end of the year. What’s hard to accept at this point is the impatience. It takes some time to get where you want to go. That can be hard for people who want to get things done—to wait two or three years to see the processes put in place.

We decided recently to move strategic planning downward into the organization, to develop it from each director, and from each individual work process, which is different from how we’ve done it before. In this way, we’re striving to identify those boulders that will make us a better organization two and three years from now, and to identify what processes we can start this year that will put us on the right path. After each director did his or her SWOT analysis, we were amazed to find that the information and the ideas that developed from the different departments—engineering, maintenance community, operations, security, and emergency management—were all parallel.

The first boulder we as a company have to tackle involves handling HR in a better way. We need to consider leadership and professional development, and career paths and succession planning, as well as an aging workforce and the related question of knowledge management. We have career employees who have been with us twenty or twenty-five years. How do we transfer their knowledge as they age and leave us? How do we continue with it and bring in new growth? In part, it means new employees, and people with new ideas who can assimilate the old ideas and still get better.

Our second golden boulder is the strategic planning process itself. How can we incorporate strategic planning in each directorate, having each identify clearly the goals and objectives that will help it improve? And then tie those goals and objectives into the budget process? One of our weaknesses, in fact, is we don’t align our budget with strategic values. With a government budget, our situation is a bit different than it is elsewhere. We’ve had ideas in emergency management, for example, about how we can better respond during hurricanes. There is money for that now because of what we went through recently. But how do you develop a plan to do leadership development succession planning with a government-type budget? How do we share the vision or the value that’s going to come from that with the DOE? These are all questions we’re continuing to address.

The third boulder concerns our company’s management by engineers. It can be difficult for non-engineers to learn the engineering mentality. Our strategic planning SWOT process revealed that yes, we’re an environment of engineers; all our processes tend to reflect this. What will help us assimilate better as an organization is the concept of project management. If project management is involved in all of our day-to-day work processes—particularly our strategic planning—we’ll be better off at the end of the day.
All these big boulders interconnect and relate to each other, and what’s also important is that they were developed from the ground up.

You can measure the strategic challenge of operational effectiveness, which is tied to our mission readiness, by looking at the number of days it would take for us to commence the drawdown of oil on the President’s order. Although operationally this can be performed within a few days, a great deal of time is needed for the administrative part of the process, such as putting the oil up for sale, allowing for the bidding process, and purchasing. Due to the breakthrough strategy of automating the process through the Internet, however, we were able to speed up the administrative part by 13%, shortening the overall drawdown time from fifteen days to thirteen.

Our community outreach plan addresses our strategic challenge of leadership communications, which ties back to the shared DM and DOE value of social responsibility to local communities. Annually, we develop a plan of community activities that we support either by participation, volunteering, or monetary assistance. For example, DOE sponsors an annual high school science bowl. We volunteer in beach cleanups in Louisiana and Texas, and our employees and senior leaders actively participate or hold offices in professional organizations in quality, safety, environment, engineering, business, and charitable organizations. Sometimes we exceed by participating more than we had planned. This is due to our relationships with local municipal and government agencies. For example, our Bayou Choctaw site recently provided an exit route for its local community after a train incident and our West Hackberry facility volunteer firefighters responded to a local house fire.

Customer and Market Focus

Dr. Kirkland L. Iones, Director Environmental Safety and Health; Scott Landry, Site Director for Bayou Choctaw; and Ronald Schulingkamp, Strategic Systems Coordinator—As a management and operations contractor for the Department of Energy, we have the entire share of our market—100%. That’s the good news. The bad news is that if we lose just one customer, we are out of business. This situation frames everything that we do. Our relationship with our customer is absolutely critical to all our endeavors.

In 1993, four companies came together to form DynMcDermott. They were DynCorp, McDermott International, Jacobs Engineering, and a relatively small company in New Orleans called IMTT. These companies put money into a pot, and hired several people to create and shape the new firm.

We wanted to design a company that was small, based in New Orleans, co-located with our customer, and very agile. We knew our customer wanted their head person to be able to speak to our head person right away, so that decisions could be made on the spot. We weren’t allowed to go too far down the track of a small company, however. Our stockholders had to accept the liabilities of our operations. For example, if the contents of one of our oil caverns were to be released into the environment, the result would be an Exxon Valdez-type situation, multiplied. This is not
an insignificant problem! Part of our customer satisfaction directive was to be very careful that we did not insult the environment. So we focused on safe and secure storage of our energy at our four storage sites.

Our client wanted to make sure we had true authority at our sites. We call this RAA: Responsibility, Accountability, and Authority. It entails a great deal of stewardship, but allows us to react very quickly, and make sure that everyone stays focused on what we need to do. Our organizational structure is set according to our contract. The government gives us a work authorization document, or WAD, through which we frame our organization in order to do what they want us to do.

Our task or market focus is basically to store and maintain the United States strategic petroleum reserve. As you have read, we have four sites located in the Gulf Coast, with a central office in New Orleans, and a warehouse in Mississippi. Two of the underground facilities are located in Louisiana and two in Texas.

Those sites are connected to local terminals and refineries, with a pipeline network, which allows distribution of crude oil to the country’s interior in the event of a national emergency. We also have access to marine terminals where we can load large tankers, providing additional flexibility.

The sites are built on top of salt domes that were formed millions of years ago. A typical salt dome starts at about 1,000 feet below the earth’s surface. All you see above ground is a series of well heads, or piping, that connect that storage cavern to above-ground piping at the surface. A typical cavern is about 2,000 feet tall and about 200 feet in diameter. That container or cavern contains approximately 10 million barrels of crude oil. The SPR has sixty-two of those caverns, giving us a total of more than 700 million barrels of petroleum storage.

We begin our market focus with our strategic plan, which is critical to our organization. We have defined several main and sub-element processes that are key to both our mission and service. Each of those processes has minimum or target values or goals established for specified periods of performance. We profit as a company according to how well we meet or exceed those measured values. That’s our main feedback mechanism.

Our listening process begins with our DynMcDermott representatives meeting with their DOE counterparts, face to face on a regular basis. The process continues through delineated requirements, through the DOE contract, and by mutually agreed-upon work-authorization directives. Those directives, or WADs, specify the detailed levels of acceptable performance, our targets, and also provide the basis for our funding. The voice of the customer can be heard systematically through our key planning processes, which include the DOE strategic plan, the DOE performance plan, numerous interactions with our counterparts, and the DOE performance evaluation and measurement plan, which provides the details for funding, and the award fee.
Our key access mechanisms include the availability of documents, and real-time performance measurement to all the directorates, and to the relevant customer representatives. We have complete access to everybody in the company through our LAN and WAN computer network systems. Our system of managing both feedback and complaints includes two-way communications and several other processes that generate feedback, such as DynMcDermott’s annual organizational assessment, in which we visit each one of the field facilities; the DOE’s on-site appraisal; our quarterly performance evaluations; DOE observation reports; and the DOE award fee letter, which specifies not only fees, but suggests areas of improvement. Feedback and complaints are aggregated and input on an assessment tracking system.

We keep our approaches to building relationships and access current with business needs through our two-way communication and feedback and complaint management system. Relationship-building is strengthened for the organization during a review process in which all of our functional groups present performance measures and the status of ongoing projects. Project review also provides feedback that can be captured in the assessment or action tracking system.

Our primary means of determining customer satisfaction is by evaluating how much of the available fee was awarded each period. We identify specific functional areas where a fee could be improved and develop action plans. The customer performance areas are surveyed each quarter, so that the entire organization can be surveyed annually. This staggered approach allows us to obtain actionable feedback each quarter and generate a constant culture of listening and learning.

We also have the ability to rapidly change based on changing customer expectations. The DynMcDermott functional areas are provided with the customer’s ranking of importance and its perception of net performance in those areas. We develop a gap analysis of the areas for action, using both formal and informal methods for customer follow-up. We meet at regular intervals to review our key performance measures, important processes, and open-action items. And we do all of this informally through our continuous communication.

On the basis of our technology and performance, DynMcDermott is considered to be the global benchmark for crude oil storage. Our past performance has met or exceeded all relevant industry major benchmarks. We have benchmarked against organizations with similar equipment and processes, and we presently subscribe to a benchmarking exchange with access to companies throughout the world.

Working closely with the DOE to develop our work authorization directives and deliverables enables us to key in on those areas most important to our customer and thus achieve these kinds of results.

We segment our customer into four groups and measure each quarterly, so the customer perceives a constant feedback process even though it involves only one fourth of the organization at a time. We also measure dissatisfaction.

We have about seventeen critical measures and about 100 lower level measures. The result of our performance with regard to those targets gives us our profit at the end of the year. We also measure drawdown readiness, a critical process. That and
fill is what we live or die by. And we use a world benchmark, which looks at what we do from a storage-cost point of view. This benchmark shows us that the technology and processes we use save taxpayers a tremendous amount of money compared to other technologies employed round the world.

Measurement, Analysis, and Knowledge Management

Deborah S. Hojem, VP and Director of Data Systems—As part of our contract with the DOE, we develop performance measures in conjunction with the DOE. Yearly, we sit down with the DOE, looking at past performance and past objectives, and also looking forward to what we need to do to maintain reserves in the operational capacity.

We select, collect, align, and integrate a great deal of data, both process and business data. Our four remote locations, the site in Mississippi where we keep recovery equipment, and our New Orleans office are all tied together on the same local area, wide area network. All the data that comes across that link also goes into our facility for the analysis of operational and business aspects of the SPR. We continually review this data, along with the DOE, looking for innovation and continuous improvement opportunities. Again, we are in the business of operational readiness. We’re not in the business of making money, per se—we’re in the business of being ready for the American people.

In 2003 when the DOE rebid our contract, which we won, we committed to saving $64 million out of our operating budget for that five-year contract. We had to work with the DOE to re-address critical performance measures, which numbered around 169 at the time. That was a lot to keep up with. There were so many of them that they were onerous to track. It was hard to make sense of the data, and to make improvements with that many measures.

We finally agreed on reducing those 169 to seventeen, what we called the critical few. That doesn’t mean the other 90% disappeared. We now have a cascading system. Those seventeen are the primary WADs and the other measures, which used to be critical, are now sub-critical.

To keep track of the seventeen measures, we use a system called pbViews, which is available to everyone in the enterprise. Everyone at DynMcDermott, our stakeholders, our security system contractor, and the DOE has pbViews on their desktop. pbViews is a hierarchical structure, a tree, of the critical performance measures that show us at any given time where we are. We update it monthly, or as needed.

pbViews indicates a measure’s owner, all the items that feed into the measure, and its status, with red indicating any problems with underlying factors. All of our critical performance measures are in this system. We have used it for about three years. This data is available all day, every day, to everyone in the enterprise.
Keeping current

As a company, you have to stay current. We look at trends, market issues, stakeholder issues—anything that might show us how to do our business better, how to save money. What rolls up into saving $64 million when you’re not in the business of making money? You have to look for efficiencies, for better ways to do things. We have performance analysis, bi-monthly customer reviews, project reviews, monthly meetings with senior management, weekly meetings with departments, and more. The process improvement mentality is ongoing at DynMcDermott.

Performance improvement examples

We had a problem with security force overtime. We have about 200 security people, and overtime was becoming very costly. So we partnered with our security firm, creating a Six Sigma team to look at ways to mitigate the overtime, changing schedules, work hours, and whatever else needed to change in order to bring overtime costs back in line. That effort was very successful.

Another performance improvement example involves the frequency of the formal monthly project reviews with the Department of Energy. Now, because we work in the same building with the DOE, we see each other often, so these project reviews didn’t tend to offer a great deal of new information. Yet every month we’d spend a fair amount of time preparing for those meetings—creating charts and so on. Costs were involved too—people from other sites had to travel in to headquarters on a regular basis. So we proposed to the DOE that once a month was perhaps a little too frequent for these get-togethers. We proposed instead that we hold them on a quarterly basis, which we tried for a year. The DOE then proposed an every-two-month timeframe instead. That’s what we do now.

Network availability was adjusted after Katrina

We were doing well with network availability until Katrina. Our central network is in our New Orleans office. We also built a redundant data center at our facility in Mississippi, which is approximately sixty-five miles east of New Orleans. It’s not a hot site; it doesn’t replicate data constantly, but we do update it frequently enough that in the event of a hurricane or other disaster in our building, we could move there and maintain operations. Katrina proved that these sites were a little too close. That hurricane took our Mississippi facility out of service. So we picked up all our equipment, went to one of our remote sites, installed the equipment, and in five days we were back in business.

Managing change

Something we have going for us at DynMcDermott is a process that manages change in our environment, so we always know where we are. Our formal change management process is a system for managing and tracking the configurations of our systems and applications and software. Any time we are in a situation such as Katrina, we can still rely on valid data to reconstitute our infrastructure.

This process was a real key to success in the wake of the disasters. Previously, we had gone through a methodical procedure: drawings, data, everything needed to rebuild our system. We hadn’t really planned to have to rebuild, but we were actually able to do it within a few days, and in the midst of the aftermath of that hurricane, put the SPR back in business, within five days.
In operations maintenance, in terms of equipment availability (pumps, motors, and valves), in order to make sure we can get to the oil when the government needs it, we’ve had 99% availability ever since 2001. It’s not because we’ve overstocked. Over the last few years we’ve moved to just-in-time restocking except for those items that have a very long lead time in terms of years and of course we do stock for critical parts. It’s a national strategic asset and in all our best interests to ensure that we meet those goals. We’re very proud not just to meet but to exceed those goals, and it’s tough to do when the goal is 99%. It becomes asymptotic—the better you get, the harder it is to get better. We really have our work cut out for us.

With our partner, we produce a long-range plan for information technology every year. We review the plan with the DOE’s CIO, look at where we’ve been, then five years out. Where do we want to go? We wrap that around the budget cycle from Washington to see what can we do at the reserve to maintain readiness. We review this plan every quarter, but once a year we sit down, go through it, rewrite what needs to be done, rewrap the budget, and submit it to Congress.

We all do ISOs now. It used to be that only management would do that kind of thing, and the workers would take their work orders and go out into the field with steel-toed boots. Now everybody at the SPR has become a knowledge worker, from the technicians at the sites to the engineers in the office. We all work on data. This situation has changed greatly in the in the last thirteen years. In the past, many of our workers literally did not know how to turn on a computer. Today, they cannot go to work without knowing how to use one.

The information our workers use has to be accurate, clear, concise, and validated. You need structured processes to be sure that the information people are employing is accurate enough to allow them to perform their job. There’s nothing worse than going into the fields with bad drawings. So the right infrastructure, tools, and processes have to be in place to ensure the integrity of the data that is entering the knowledge worker’s inputs.

Data security is a huge task for us. The strategic reserve is a very attractive target for cyberterrorists. At the physical sites, there are dogs and guns. In the cyber world, we have developed an elegant in-depth defensive security system. In 2005, there were more than 600,000 cyber attacks on the SPR network, 100% of which were blocked. This goes on twenty-four hours a day, seven days a week. SPAM is another big issue. During that year we had almost 1 million SPAM emails come to our office. The ability of the cyberterrorist to interrupt business is significant and real. We have to keep our data safe, so that we can meet our mission, and so that all our people in the field are comfortable, and all their data are secure.

We are a member of the IEA, the International Energy Agency, and in order to belong to that organization, one must have a strategic petroleum reserve. We are the world benchmark, and in terms of what comes out of your tax dollar, in terms of operational readiness.

Everyone at DynMcDermott is a knowledge worker

Data integrity is vital

Data security is a special challenge

World benchmark
of money spent per barrel stored, we are definitely at benchmark. The reason is our salt dome cavern technology. Salt is a self-closing structure, so all we have to do in terms of maintenance is to depressurize the caverns occasionally. For that purpose, we keep about 1 million barrels of concentrated brine in the bottom of each cavern. Our dollars-per-barrel cost is 20 cents, which includes total cost for development as well as maintenance and operations. The US industry storage average is $2.40 per barrel; in Europe, it’s about $1.60 per barrel. In Japan, where they use above-ground steel tanks and floating containers that must be maintained, the cost is $3 per barrel.

Human Resources

Michael Vermeulen, Vice President and Director, Business Operations, Arlene Jacobson, Business Supervisor, and Chris Times, Senior Instructional Designer—Many companies sincerely espouse the idea that their personnel are their most valuable assets. But because everything we buy to operate, maintain, and manage the SPR becomes government property upon receipt, we don’t have assets. So people are not only our best asset, they’re our only asset.

DM’s value system is supported by the visions and goals of the human resources department. Our culture is focused on responsible stewardship of the strategic oil reserve for the American people, protecting and developing a diverse workplace, acting ethically in all that we do, and continuously improving. Cooperation, initiative, innovation, and empowerment are the basis of our high-performance, values-based culture.

Our work systems are designed to ensure that our staff is continuously drawdown ready. EAGLE exercises—EAGLE standing for Every Action is a Great Living Experience—are conducted regularly to ensure that our staff is ready, in the event the President gives notice to draw down.

DM values our employees and the cultures and diversity that they bring to our workforce. Effective communication skillsharing is achieved through a structured project management system. DM has designed all of its facilities identically to enhance communications and skill sharing. Our employee performance management system uses a formal approach to oversee an employee’s career, set work goals, and reward good performance. The systematic approach allows employees to participate in the overall work appraisals.

The strategic planning process and technical requirements are included in the WADs, our work authorization directives, which identity critical projects that are then broken down into tasks and jobs. The HR department defines related jobs and descriptions based on local, regional, and national job descriptions.

Although we’ve had a less than 3% turnover rate since 1999, DynMcDermott has a systematic approach to recruiting, selecting, and hiring, known as the lifecycle process. This process uses a comprehensive analysis software tool to determine the demographics of the workforce compared to the hiring community. When a position
Hiring and career progression, continued

DynMcDermott keeps pace with technological change

DM’s succession planning for leadership and management is a six-phase system:

Phase one: Leaders engage in strategic planning processes.

Phase two: Leaders determine training and career development plans.

Phase three: DM’s performance development department constructs training and development plans known as IDPs, individual development plans.

Phase four: DM takes employee preservation or retention measures to retain talent.

Phase five: Formal process begins for employee appraisal and feedback.

Phase six: Succession planning effectiveness is evaluated, monitored, and improved.

Our main action plan is to make sure that our employees receive the training and career development assistance they need to do their jobs—it’s as simple as that. Our motto is that we’re enabling to excel. At DM, we use many different methodologies for achieving better career development. One involves performance and process improvement teams. Employees from both New Orleans and the worksites join together to improve processes. They may tackle an issue such as on-the-job training, or improving our new hire process. It really depends on the issues and problems that we have at the time. We work on these projects as teams, coming together with ideas, looking at ways to do things in a new way. The great thing about DM is we’re open to that.

We also have Six Sigma teams for performance improvement. We have about twenty-four people who’ve completed all of the training, and we’ve used a lot of what we’ve learned to improve our efficiency and institute cost-effective ways of doing things.

In training as in all other areas, technology is constantly changing, and we have to keep pace. We have an excellent learning management system and through this system we implement and launch all of our training. This includes web-based training, which we develop in-house. We use Flash and other software to develop our courses. We currently have thirty-five to forty courses we’ve developed ourselves on topics from safety and health to human resources. We also have about forty-five to fifty compliance courses that we’re tracking in the system as well. And we use web-based systems to evaluate our training. We develop on-line forms to send out evaluations as soon as courses are done. Every course has exams, so we have ways of figuring out how we’re doing when it comes to training people.

We’re looking at how well the employees are taking what they’re learning and applying it to their jobs. This involves going to the supervisor and asking whether an employee is using his training on the job. Did he learn what he was supposed to? Is he applying it? We ask the employee the same questions, and use this to improve what we’re presenting to our students and to improve what we’re offering.

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New employee orientation

All new employees spend at least one full day in New Orleans and at the sites. They watch several videos on records management, safety, and diversity, in addition to online courses. Everyone has a certain amount of required training. Under diversity we have counsel at DM that comes up with projects and positive ways that we can impact the community.

Every employee is required to take ethics training. And we have an ethics policy and procedure that each employee must read and sign.

Leadership and management training

We’re working on a more formalized leadership and management training program. We have leadership and management courses that our leaders and supervisors have attended, and for the past two years they’ve been in ongoing training. We’re planning to further formalize our program and to develop a curriculum that meets everyone’s needs in terms of turning supervisors into managers and leaders.

Employee and management input

We want to know how well we’re doing, so we’re constantly asking questions such as: Did you get anything from this course? Did we cover the objectives? What can we do to improve? We send out online evaluations. Each course has a comments button on the menu page, which pulls up a form for the employee to fill out. All this information is put into a database that we use to improve what we’re offering.

Last year we created an online personal development form that was sent to all our employees. They had to sit down with their supervisors and look at short-term and long-term goals, and provide feedback to us. We found this was a good way to collect information and now we’re trying to tie it into what we’re presenting to employees with the company’s organizational objectives.

Ensuring employee well-being

DM has mature systems in place to ensure workplace health, safety, security, and ergonomics. Our behavioral safety system is employee-driven, using observational processes to evaluate workplace health, safety, and ergonomic behaviors. Employees can submit safety concerns to our safety management council at any time. Our OSHA voluntary protection program is a partnership between OSHA management and employees at all four remote sites. All commit to support a safety and health program that goes above and beyond legal requirements. All four sites are both OSHA and DOE star program facilities. In order to be a star facility, you must have accident rates equal to or less than those of the board of labor statistics code, and pass a four-day, four-person site inspection.

DM has a complete emergency response system, consisting of teams at all four facilities. The teams exercise annually, with fully developed scenarios. This ensures readiness and preparedness for disasters of any kind.

Determining key satisfaction factors

To gauge and assess employee satisfaction, you need to determine the key factors involved. We use a variety of methods to determine these. We have “breakfast with the boss,” and we also solicit input from employees.

We spend a lot of time modeling and developing employee benefit programs that provide the most flexibility. Three years ago, we implemented a cafeteria-style
health plan, recognizing that we have a very diverse workforce. People at different stages of their lives have different needs. So we try to structure our benefit and compensation structure to benefit them.

In terms of overall satisfaction—a macro-level indicator—we’re significantly above the national benchmark and have a very positive trend. We did have a little downturn in 2004, and that’s directly attributable to a reduction in the workforce that we implemented in response to some contractual commitments.

When we survey, we ask employees to respond to the statement: “I am proud to be associated with DynMcDermott”—that’s another macro-level indicator. This question actually represents the accumulation of various questions related to employee satisfaction with the company, and their feeling that it’s a place they want to work, and this indicator also shows constant improvement, and is significantly above benchmark.

We do whatever we can to empower our employees. The question is, are we doing it to their satisfaction? We’ve gauged this over time, and we’re significantly above our goal. However, there’s still some room for improvement, and this is an important area. You measure what’s important, so we continue to measure it.

**Process Management**

Warren Jones, Director of Quality Management; Joyce Teerling, Manager of Emergency Preparedness; David Giles, Site Technical Manager, West Hackberry—For the drawdown process, we pump oil out of our caverns in the ground and distribute it to whoever wants it. The process begins with a call from the President of the United States to the Department of Energy in New Orleans. He might say, “Release 30 million barrels of oil to industry.” Next, the DOE goes into a negotiation period with the refineries to see who wants the oil and how much they want. Once information is obtained, we pump out the oil to whatever refinery wants it, in the number of barrels that they want. It takes us about two or three days to get the equipment ready to pump once we receive the order. It takes the DOE about a week or so to do all the negotiations. However, the whole process does not take more than thirteen days.

At DynMcDermott, we consider two major types of processes: key value-creation processes and also support processes. The requirements for value creation processes are determined through collaboration with the Department of Energy. We incorporate changes in the DOE mission requirements and orders and DOE strategic plan. Anything that changes in those three elements we incorporate into our strategic plan, as well as any action plans associated with that. We incorporate changing customer, supplier, and stakeholder needs through daily communication and weekly, monthly, quarterly, and six-month reviews. All of our processes incorporate customer feedback and many processes incorporate supplier feedback, such as dealing with security and emergency preparedness. We look to our suppliers for a lot of guidance because they’re the experts with regard to that type of equipment.
The way we design value creation processes and support processes has evolved over the years we’ve been in existence. The reserve was created back in 1975 as a result of the oil shortages of the early 1970s. So we’ve been in business now a little over twenty-five years, and over that time, we’ve evolved all of these processes in conjunction with our customer. Requirements are provided throughout the design cycle of our processes by the DOE suppliers and internal departments.

All critical points for measurements and observation feedback are established, tracked, and managed through our project management milestone system. Design variation and waste is minimized for a customer-centered, collaborative approach, in which we look at all the alternatives, along with the customer, to make sure we picked the right ones.

Overall costs associated with the inspection tests and processes and performance audits are minimized by maintaining a highly trained and professional pool of auditors. We have several lead auditors. We have people certified in Six Sigma, and we also cross-train these people so they can look at multi-disciplines when they go out. If we want to look at, say, ten disciplines at a site, we may only send four people, because they’re multi-discipline-capable. This approach also saves us money.

Design is in itself a nine-step process. Steps one through four involve identifying the requirements and defining the process. Steps five through six employ the FMEA mode, which involves failure modes and effects analysis. Step seven is the analysis that provides management with the facts necessary for making a decision. Step eight is the implementation of management decisions. Step nine is the control that requires management of performance and subsequent improvement of the process. We incorporate new technology and organizational knowledge during step number three, at the develop conceptual design phase, and further in step four, when we build the house of quality, and then in step five when we benchmark with other DOE facilities and industry.

Engineering design also has a process that we work through. It’s important to note that the complexity of the design dictates the process—we don’t go through all of these steps for every process that we develop. If it’s a very complex design, we do go through most of them. If it’s a very simple design, and it just requires a statement of work, we will start off at step number three.

We also have a feedback loop, so we’re constantly looking at our processes, no matter what they are, and improving them as necessary. If we find a process that’s not working correctly or needs a little fine-tuning, we will develop a process improvement team to take a look at that process, and then go back and make some suggestions as to how we can fix it.

Our key support processes are:

- Leadership development
- Strategic and action planning
- Performance improvement
- Project control
Case Study • DynMcDermott Petroleum Operations Company

- Contracts and procurement
- Quality assurance
- Inventory management
- Crude oil accountability

The key value creation processes are:

- Crude oil acquisition. In order to be able to pump the oil out of the ground, first of all, we’ve got to put it in there. That’s the fill process. This oil mainly comes in by ship from outside the United States.

- Drawdown process, as described earlier.

- Vapor pressure. This is a methodology by which we take unwanted gases out of the oil to make it more marketable before we provide it to the client.

- Crude oil quality. We check the oil before it comes off the ship and after to make sure it’s high quality and worth putting in the ground for storage.

- We have several maintenance processes, to keep the equipment operating.

- Cavern integrity. Salt domes have a tendency toward what we call creep; they try to close up on us. So we maintain the volume by pressurizing them. We have a group that is dedicated to making sure the caverns stay in good shape.

- Emergency preparedness. In case we have a fire, or spill some oil, we can’t just call the local authorities to take care of it for us. They don’t know how to do it. We have our own fire department, our own emergency preparedness people.

- ISO 14001

- We have a great deal of security with regard to terrorism, as is obviously necessary in these times.

One measure of operational effectiveness is storage volume. We were authorized to go to 700 million barrels of stored oil prior to Hurricanes Katrina and Rita, and then got the drawdown order from the President to release 30 million barrels, at which point we went back down below 700. Now we’re working to get back up to 700, and Congress is talking about increasing the total to 1 billion barrels.

Our maintenance performance appraisal report measures how effective our actions are. This is a compilation of several different aspects: availability, reliability, number of hours spent doing maintenance on the equipment vs. the number of hours that maintenance people spend doing other things. They’re all weighted, and then compiled. Our target is 95% and we’ve always been well above that.

Environmental results are very important. Most of our sites are in wetlands and if we spill any oil, it’s a big deal. So we have to be careful we don’t have any environmental violations, and we haven’t.

Journey to Excellence

Charles K. Tolleson, V and Director, Strategic Performance and Communications—Our continuous improvement journey has several things in common with any journey. First, you must have a reason for the undertaking. Ours addressed our core competencies of operations, technology, and business. It also addressed our strategic challenges, which we derived through our strategic planning process, and also through...
environmental scanning.

Next, a journey should support the objectives of an overall plan. Our plan consisted of these seven highway markers:

- Select a destination, however far
- Provide the leadership for the journey
- Create the culture of the journey
- Impart the necessary knowledge of the journey
- Supply the tools
- Empower the experts
- Celebrate the successes

Most journeys include a map. Ours depicts the chronology of our journey, and our growth in embracing both theory and method. We started with basic Total Quality Management and theoretical concepts, and we continued to build our abilities to match our requirements. These included team processes, state quality award processes, Six Sigma implementation, Lean applications, the ISOs, and of course, the Baldrige Criteria.

A journey may answer some questions even as it raises others. Our journey forced a continual consideration of our six questions. We considered the answers to these questions as our organization’s ground truths.

A journey consists of many components. Our integrated quality system is built on a foundation of values-based leadership, and supported by continuous improvement tools, techniques, and methodologies. Ours is a building that literally stood against a storm.

Just as you monitor critical metrics on a journey, we measure key performance metrics using a software solution dashboard. It empowers process owners, and that dashboard is available to all employees and is customized for each key function. Most journeys include feedback, whether it comes from the occupants of the rear seat, or from the “assistant driver.”

Feedback for the journey

For feedback, we use several award processes that have state, national, and international criteria in their award process. Environmental and quality performance are both centers of gravity for us, as subjects of third-party validation and feedback.

The journey has both main and side roads

Some journeys consist of side roads that lead to main roads and wind toward ultimate destinations. One of the main roads on our journey to excellence has been the implementation and application of the Baldrige Criteria.

We’ve encountered winding roads along the way, which has added to our experiences on the journey thus far—we have yet to reach what we call our destination. One of our winding roads led us to conclude that an optometrist’s examination makes a good comparison to the Baldrige Criteria. An optometrist asks patients: “Is it better here?” Click click. “Or is it better here?” Click click. In the same way, the criteria never tell you that you are right or wrong, never say that you must do this or that. They just ask: “Is it better here? Or is it better here?”
Another winding road on our journey was connected to a passage from Alice in Wonderland:

Alice asked the Cat, “Which road should I take?”

The Cat replied, “Well that depends on where you want to go.”

“I really don’t care,” responded Alice.

“Then it really doesn’t matter which road you take,” answered the Cat.

— Lewis Carroll, *Alice in Wonderland*

How profound this conversation is. Until we answered these questions we were just some very good people doing a very good job in a very important mission. Our journey gained in its meaning when we all shared a vision of where we wanted to go.

Most might agree that the best journey is one that serves a purpose. Our journey serves to guide us through an environment of continuous change involving many factors.

Finally, every journey has its key players and beneficiaries who are along for the trip. We call these our stakeholders and they go by many names. The focus of our organization and its members is on our customer, the Department of Energy, who represents 100% of our market share.

### Lessons Learned

We are not at the journey’s end, but we have learned some lessons that we are happy to share:

- Provide clear direction. People have to know where the goalposts are.
- Answer those “six questions.” (see page x)
- No matter how good you are, get better. Don’t be trapped by previous successes.
- Establish the business case for action throughout the organization.
- Use the Baldrige Criteria daily to assess and stretch your organization.
- Focus on your stakeholders—your customers, your people, suppliers, partners.
- Involve your customer in your processes, in the development, in the output.
- Get, use, and provide feedback.
- Act like it has to be done. Act like it really matters.
- Trust good people to do good things.
- If not using Baldrige yet, then use your state and local quality programs.
- Finally, cherish people, and revel in their success.

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Open Source Your Innovation

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Open source has gained popularity due to its versatility. Its roots stem from the computer industry where programmers openly shared code in order to develop, debug, and improve software. The Linux operating system and the Firefox web browser were born from this movement, becoming formidable challengers to the products of the industry leader, Microsoft. While technology enables open source to flourish, open source is not limited to the development of new technology.

The philosophy behind open source is that it is a combination of community building and competency building. The creation of knowledge—and thus the development of new innovations—resides within the variety of social networks that exist around us. Open source innovation might be a virtual network or a literal network of product developers, customers, users, etc. that share information and resources to create breakthrough innovations or to make incremental improvements to existing innovations.

University of Chicago sociologist Ron Burt¹ has written about networks with “structural holes” that have enough inroads from individuals to allow for the sharing of new ideas. Open source innovation is essentially a network relationship among individuals in which the network environment remains open enough (i.e. it contains structural holes) to allow for new ideas to take root, which might yield new innovations. Managing knowledge in open source innovation communities starts with maintaining the networks themselves and keeping track of the flow of knowledge and ideas within them.

In open source innovation communities, value chains are not represented by ‘handoffs’ among mutually exclusive parties, but rather by overlapping communities of users and developers. Known as communities of practice, these are groups of people informally bound together by shared enthusiasm for a joint enterprise. Their purpose is to build and exchange knowledge. Involvement is self-selected and is held together by passion, commitment, and identification with the group’s expertise.²

Another and more adaptive model is further defining the qualities of these innovation communities. Communities of competence³ satisfy the desires for community in a workplace, but they are designed to incorporate and strengthen peoples’ competencies, self-confidence, and performance in the increasingly boundary-free organizations that require a great deal of self-authorizing and ambidextrous behavior. Members of such communities are shown to be more skilled at meeting demands for increased productivity and innovation.

The strengthening of both community and competency drives innovation. Yet many companies are challenged in their abilities to develop these critical areas. The failure to develop both community and competency is, at its heart, a failure to nurture a culture of learning. Maintaining innovation networks and managing the flow of
knowledge within them involves a dedication to fostering community, competency, and, ultimately, learning. Let’s take a closer look.

Imagine innovation without a community

Daimler-Benz and Chrysler Corporation merged in 1998 to form DaimlerChrysler under the premise that it would be a “merger of equals.” The merged company anticipated the sharing of resources and knowledge in order to streamline costs, strengthen quality and engineering, and create product innovations. Nearly a decade later, DaimlerChrysler sold nearly 80% of its stake in Chrysler to the private investment firm Cerberus Capital Management. Today, Chrysler LLC and Daimler AG stand alone as separate companies.

The merger was one of “yin and yang” opportunity for each partner to complement each other’s capabilities.4 While the “yin and yang” mentality reflects community, such promise was largely absent at DaimlerChrysler. The two halves remained largely separated from one another with little shared costs or innovations, facing quality problems at Mercedes, a lower Chrysler market capitalization, and wary German product developers concerned with the reputation of the Mercedes brand.

Large mergers are often billed with the best intentions to innovate and grow at a sum greater than the two parts could otherwise grow independently (i.e. making 2+2=5), but the lack of effective community building between merged units often results in large scale failures with little innovation or shareholder value to show for it. While the innovation community suffered during the years of the DaimlerChrysler’s entity, the newly separated companies each face the same task of continuing to develop their respective, independent communities. The two companies continue to share resources in the area of drive systems. Ironically, without the burden of forced relationships that are compelled to flourish under the formalities of a merger, the two independent companies might be in a better position than they would have been as a single company to develop an innovation community around the development of drive systems.

Alternatively…

Herman Miller is widely recognized as a producer of some of the most innovative designs in the commercial and home furniture markets. Herman Miller is also known for its community of designers and the way in which this community is nurtured.

In one sense, Herman Miller takes an open source approach to design by tapping into a network of independent designers who are kept at arm’s length from the daily operations of running the business. In another sense, Herman Miller’s designers form a community among themselves such that they collectively learn the ropes of the company and learn how to work collaboratively on projects to create design solutions.5

The track record at Herman Miller has been impressive. From the iconic lounge chair, designed by Charles and Ray Eames in 1956, that is still produced today, to the sophisticated Aeron chair designed by Don Chadwick and Bill Stumpf, Herman Miller has produced numerous design innovations while embracing the design community and nurturing its design partners.
The strong Herman Miller community enables the company to nurture a culture of learning. For every design that becomes a legend, several lesser designs are ways for the design community to determine what works and what doesn’t work in order to move toward the next innovation. Even the company at-large has reinvented itself numerous times through learning and self-assessment, most recently when the market for new office furniture declined with the dot-com bust. The company embraced its internal community to determine its strengths and chart a plan for new innovation and growth opportunities. Today, Herman Miller prides itself as an innovative company that happens to sell a lot of furniture. In 2006, Herman Miller launched more new products than at any time in its history. The company also engages eco-metrics such that a “zero environmental footprint” is a major component of its innovation and growth strategy.

Now Imagine Innovation Without Competency

JetBlue turned a profit in the tumultuous airline industry by differentiating itself from both the legacy carriers and the low-cost carriers with some simple innovations such as leather seats and satellite TV with comprehensive in-flight entertainment for every passenger (media marketing partners). The company is also known for its strong sense of community within the workplace giving it a consistent, if nascent, track record of employee and customer satisfaction.

Recently, however, JetBlue suffered a major setback. In February 2007, the company stranded thousands of passengers during winter snow storms by leaving them to sit on airplanes for hours while grounded. Many flights were ultimately cancelled, the company’s phone and reservation systems failed to process information quickly enough, and many airline employees simply did not know what to do. In short, the company showed a lack of competency when pushed to the limit.

The innovations alone will not substitute for a competency failure. Even the most luxurious seats become uncomfortable after sitting in them for several hours and the satellite TV monotonous. JetBlue suffered some deserved criticism immediately following the incident, which ultimately forced the CEO to step down. The new CEO, however, committed to the long term health of the company by learning what worked and what didn’t work during the course of the recent events in order to emerge as an operationally stronger airline. A competency failure can become a learning opportunity, leading to innovative solutions, if embraced correctly.

Alternatively…

Some of Toyota’s most significant product innovations include the hybrid Prius and the Lexus line. Yet for each breakthrough innovation there is a continuous output of smaller innovations. Innovation at Toyota might be as simple as an improved radio control or an improved transmission component. The fact that Toyota innovation can be described as incremental and invisible is a testament to Toyota’s competency building culture. The company embodies the Japanese concept of kaizen, or continuous improvement. Inherent to this is a culture of competency building within its workforce. Toyota builds the competence within its workforce on how to embrace continuous improvement.
Toyota’s community is strong too, as it embraces many traits of an open source development community including self-authorizing behavior. An example that ties Toyota’s competency and community to a learning and innovative outcome is the series of events that occurred after a fire in 1997 that destroyed the factory of a critical part supplier. Immediately after the fire, several of Toyota’s tier one and tier two suppliers collaborated by mobilizing both their knowledge and resources, which ultimately led to the production of a suitable replacement part by a tier two supplier. The tier two supplier achieved an innovation by sharing knowledge and designing a product which was new to them. The original supplier learned from the experience and drafted procedures for potential future catastrophes. Toyota enabled its suppliers to build new competencies, while it effectively managed its supplier community.12

How to Build Community and Competency—Learning from Small Firms

The nurturing of a community/competency-building learning organization is a task that many large companies face but need help in implementing. Some of the previously discussed example companies enjoy the benefits of either being young, entrepreneurial, and flexible, or well-established with a foundation in these principles. Small firms set an example, both directly and indirectly, on how to build a learning organization around community and competency.

Menlo Innovations is a small software development company based in Ann Arbor, Michigan, whose value proposition goes beyond the software it sells to include some of the pieces of the community/competency-building puzzle. Named after Thomas Edison’s Menlo Park laboratory, the company embraces many of Edison’s principles of community and continuous improvement, and iterative innovation.

The complex hiring process at Menlo is more akin to dating rather than a formal interview. The initial interview is like a speed dating event, and the secondary interview is more akin to ‘going steady.’ Job candidates are evaluated on what they know, willingness to learn, and the extent to which they strengthen the Menlo community.

Menlo works against the cultural norms of the software development world by taking a generally introverted group of programmers and sitting them in an open room at large tables. Two programmers always work at the same computer on the same project in order to learn from one another and build competencies. Once a week, the pairs are reshuffled in order to nurture the work community and maximize the amount of competency-building interactions.

While the internal Menlo community is strong, their relationship with clients is based on the same principles of community, and these principles allow Menlo to provide clients with more than just software. Menlo’s internal structure eliminates the ‘tower of knowledge’ model. The image of the star programmer who creates a ‘killer application’ is replaced with a community driven approach that embraces the fact that only the client knows what’s best for the client. Members from the Menlo team visit the client’s worksite in order to see how the client uses software and other technology, and the client is required to spend time with Menlo in order to learn about their community and practices.
Putting it all together

Imagine a company in which community and competency were so critical to their value proposition that a failure of either one would devastate the company’s reputation. Think eBay. Imagine if eBay failed with respect to community or competency. eBay’s success is attributed in part to the success of its user community. The company has established rules that facilitate the strength of the user community. If rules did not exist, the eBay buying experience would be significantly more difficult. Millions of buyers and sellers would have no way to establish trust among each other.

Another equally important community that eBay manages is its business partners that make the eBay experience possible. eBay has been described as a “network orchestrator” that manages a community of business partners that span the value chain ranging from the search engines that display eBay’s website to the credit agencies that authenticate consumer credit data, to the shipping partners that facilitate the transfer of goods. Community members have a strong incentive to innovate because it strengthens their position within the community. Simple innovations such as the readily available eBay shipping boxes that are co-branded with the U.S. Postal Service and the USPS shipping labels that eBay sellers can print from home stem directly from this orchestrated community.

eBay’s success is also attributable to its technological competencies. The company has built and managed a complex website that must be reliable and facilitate many different types of transactions. eBay’s own corporate processes reflect its commitment to the nurturing of competency and community. In a process similar to the interchanging of work pairs described at Menlo Innovations, the company recently initiated a ‘cubicle swap,’ which is intended to bring the company’s engineers and business people together to work collaboratively on projects.

One of eBay’s most pressing challenges it currently faces is the usability of its website. Online shoppers have countless options for buying and selling goods. eBay must continuously reinvent its technical competencies in order to stay on top of usability issues. The company is engaging its customers by researching how they use eBay in order to improve the eBay experience. Listening to customers and including them in your “community” of product developers is a way that a large company can co-create with customers. Menlo Innovations does this intimately with each client. eBay does this through specialized research teams that work with selected customers.
Conclusion

Innovative companies are organizations that nurture both community building and competency building. Community and competency together yields learning about how to do things better, which is the fundamental purpose of innovation. Open source facilitates knowledge sharing, and it facilitates diversity within those sharing mechanisms. Open source breaks down barriers that were once thought to protect companies from competitors by rewriting the rules of competition and collaboration.

Leading the charge to achieve this requires self-authorizing behavior since innovation networks and communities rarely exist within the architecture of formal organizational structures. The checks and balances to maintain their success lie solely within the hands of the participants. It also requires ambidexterity and flexibility. The market is unpredictable. Strategies fail. Talented people move from one company to the next. Innovation can not be planned, but leaders build the capacity to recognize and seize the right opportunities. Community and competency will give you capacity to ask what worked, what didn’t work, learn, and then innovate.

Sidebar: Learning the Rules of Open Source

The open source form of innovation brings knowledge resources together in order to generate new ideas. Being collaborative in nature, open source projects are iterative and ongoing. As leaders look for new growth opportunities, it is increasingly critical to consider the rules of open source and how to use this form of innovation to create value.

Open source is about harnessing the collective creativity within communities in order to generate knowledge and ideas. Open source shifts innovation’s center of gravity and creates diseconomies of scale. It is no longer sufficient to ‘own’ every innovation-producing resource. Instead, companies must also integrate a variety of loosely coupled innovation-producing resources.

Take Herman Miller and Swedish-based Ikea. Like Herman Miller, Ikea manages a network of freelance designers who can focus on what they do best. The company gives them design challenges, which forces the designers to search and reapply what works and what doesn’t work. Ikea also works with a variety of manufacturers to build its products. It has even partnered with a ski manufacturer because of that company’s expertise in molding wood.

Herman Miller and Ikea innovate through integration. Product innovations and value are created by managing a network of innovative designers who are allowed to focus on what they do best. These designers are part of an open source network where they are given the opportunity to learn and perfect their craft.

Silicon Valley is a breeding ground for open source projects. It is also a very competitive environment—companies seek funding while investors are looking for the next breakthrough idea. Yet Silicon Valley wonderfully illustrates how these two forces, collaboration and competition, intersect to produce value.
One example would be Zend Technologies of Cupertino, California. While Zend operates an open source website programming language that competes with Sun Microsystems's Java and Microsoft's ASP.net languages, one of Zend's major sources of venture capital is the funding arm of Intel, and it has collaborative partnerships with IBM, Oracle, and even (despite its competition) with Microsoft. In total, Zend has acquired over $36 million in venture capital funding.

Why is a small start-up so attractive to both investors, as well as larger companies, in the computer industry? Zend's open source community and its partnerships place the company at the core of a larger innovation network.

Many companies are realizing that co-creating with their customers is a way to find new innovative growth opportunities. Companies decreasingly dictate needs and corresponding solutions to their customers. Instead, companies and their customers are realizing the growth potential in figuring things out together. In this relationship, knowledge-sharing and mutual learning augment innovation.

What are the reasons behind the growing popularity of Wikipedia? Wikipedia is an open source, online encyclopedia whose content evolves and expands as users contribute to its content. Despite criticism from scholars, who question the integrity of Wikipedia content, it gives users the opportunity to see how information and the understanding of any one topic have evolved. The user-generated approach to Wikipedia is a real time window into the social construction of knowledge.

Wikipedia is disruptive. Wikipedia directly challenges what people consider valid knowledge. Traditional encyclopedias are carefully researched and edited by a small group of scholars who judge the worthiness of knowledge and traditional encyclopedias become obsolete the moment they are printed. Assuming that most Wikipedia entries are developed by people who actually have knowledge in the respective subject, Wikipedia is a democratic, open source, real time approach to knowledge development.

In the open source world, anybody can innovate and create value. Think how eBay and Amazon Marketplace work. Small businesses and individuals can sell their goods on either network, and user feedback strengthens the reputation of the network and its participants in a self-reinforcing loop. eBay and Amazon build the value of their respective businesses through this community, and the individual sellers who comprise each network build value for themselves.

By using open source components, someone who is inexperienced at building a website can now build a very functional intranet for a small business by integrating various web-based applications into a single package. Open source levels the playing field in terms of skills and competencies. Components in the open source world are developed by experts and are assembled by expert users.

Endnotes, continued


16. Ibid.

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Manufacturing the Solutions

L. Hunter Lovins, President and Founder, Natural Capitalism Solutions, Eldorado Springs, Colorado

As business and industrial managers, you may think of what you do as a job. I see it as essential to the survival of life on earth. Creating innovative and sustainable ways to make the things we need and deliver the services we want is going to determine whether or not we survive as a species. Governments won’t give us the answers: we need solutions at the speed of business.

When Royal Dutch Shell uses scenario planning to explore what the future might bring, they look for what they call drivers of change. These are signs that business as usual will not endure. We are facing some formidable ones:

- We are losing every major ecosystem on the planet
- 10,000 more people arrive on earth every hour
- We live in a carbon constrained world
- Our infrastructure is vulnerable
- Energy prices are at record highs, if not peak oil
- The sustainability imperative

Collectively, these drivers mean that we are going to reinvent every institution on the planet—companies, government, and civil society.

The recent UN Millennium Ecosystem Assessment, conducted by scientists from most of the world’s countries, concluded that we have polluted or overexploited two-thirds of the ecosystems on which life depends. Because business cannot long endure on a dead planet, it is the business of business to solve this problem. And increasingly, we know how to do that at a profit.

How did we get in this mess? It came from a time in our history when it made sense to do business as we currently do. In the first industrial revolution we had relatively few skilled workers to run the new machines, but we had lots of nature. Profit-maximizing capitalists economized on their scarce resource—people—and substituted or subsidized the use of the plentiful one—nature. We succeeded marvelously, increasing labor productivity 100-fold, and now live in the most prosperous time in human history.

But now 10,000 more people arrive on earth every hour and we are losing every major ecosystem. The logic of capitalism still obtains, but the relative scarcities have shifted. Profit maximizing capitalists will now use every resource dramatically more efficiently.
We will increase resource productivity as we did labor productivity in the first industrial revolution, but more importantly, we will seek to increase “total factor productivity.” Every input to the economic equation will be used more efficiently. We already know how to increase resource productivity at least fourfold and increase profits. This is because the way we do business right now is extremely wasteful. The amount of stuff that we dig up and put through various resource crunching activities, then throw away amounts to a half-trillion tons globally every year. Of all this stuff, less than one percent of it ever gets put into a product and is still there six months after sale. Trimming this waste represents an enormous business opportunity. And companies are starting to capture it.

EcoCover, Ltd. designed a process combining waste paper with fish waste to make a substitute for the black plastic sheeting now made from petroleum. Their product fertilizes the soil as it degrades. PortionPac, an industrial cleaning company in Chicago, realized that rather than shipping drums and gallon jugs of mostly water with a little bit of cleaning solution they could ship portion controlled packets of concentrate for a much lower cost. They also made sure that it’s not toxic and color-coded the packets to reduce errors. The CEO of the company now gives speeches detailing how his commitment to sustainability is driving his profitability.

The biggest company in the world, Wal-Mart, is saving money by reducing waste. Eliminating waste packaging in one product line saved them $2.4 million in shipping costs and a million barrels of oil. Lee Scott, CEO of Wal-Mart, said, “If we throw it away, we had to buy it first. So we pay twice—one to get it, once to have it taken away. What if we reverse that? What if our suppliers send us less, and everything they send us has value as a recycled product. No waste, and we get paid instead.”

Using energy inefficiently costs Americans at least $300 billion each year, and is driving climate change. We know we can do better. For example, the engineer Jan Schillam was able to redesign an industrial pumping loop that used ninety-five horsepower to use only seven horsepower, and it worked better and cost less. How? First, he used big pipes to reduce the friction, which enabled him to use much smaller pumps. Engineers typically don’t use bigger pipe because the extra size costs more than the energy saved by reducing the friction. But the reduced friction also makes possible the smaller pumps, saving even more energy and money. Schillam also laid out the pipes before the equipment that they connected. We typically do it in reverse order. With his layout, the pipes could be short and straight, resulting in even less friction. He optimized the whole system, not the bits in isolation.

Some companies are taking bold steps to change their practices. DuPont has already cut its emissions of greenhouse gasses 67% below its 1990 levels for a savings of $3 billion. ST Microelectronics pledged to become carbon neutral by 2010 while at the same time achieving a forty-fold increase in production. When they made this announcement they had no idea how to achieve it. Figuring it out, though, is driving their corporate innovation, taking them from the number twelve chip maker in the world to number six. They won the Best Industrial Renewable Energy Partnership from the European Union in 2004. By the time they are climate neutral, ST projects it will have saved about $900 million.
One of the best places to begin controlling energy usage is in buildings. Buildings use about one third of total energy, including two thirds of electricity. They are responsible for 30%–60% of greenhouse gas emissions, 30% of waste output and 30% of raw materials use. To produce a product in the workspace is frequently uncomfortable or even toxic. We know how to fix up existing buildings to use three fold less energy, new ones ten times less.

The flagship Condé-Nast Building in New York City looks the same as a normal office building and cost the same to build, but it uses half the energy and gets most of its energy from photovoltaics (solar cells) on southern and western sides, and a fuel cell in the basement. In the 2003 Northeast blackout it was the only building around with light. People came from blocks around to camp out beside it. This is not only a higher performance building; because it cannot be turned off, space leases at premium rates; it also represents genuine homeland security.

Another New York company, Harbec Plastics Ltd., invested in a co-generation plant and a windmill. This enabled Harbec to keep working during the 2003 Northeast blackout. Some of its competitors had outage costs of $50,000 an hour. Not having to shut down paid off the capital costs of the improvements.

Energy efficiency gives us healthier economies. A typical community spends 20% of its gross income on energy and 80% of those dollars leave the community. That’s a reverse economic development. The general manager of the Osage Iowa Municipal Utility, Wes Birdsall, figured out a solution to this problem. He recognized that his customers do not want a kilowatt of electricity. What they want is the services energy gives. He used efficiency rather than any kind of new supply to deliver the desired energy services. He saved a million dollars a year in this small rural town, cut energy bills to half that of the state average, and cut unemployment to half that of the national average because with lower bills more factories came to town.

The finite oil supply is another driver of change. In the 1950’s, M. King Hubbert, a Shell geologist, pointed out that if you have a finite resource and growing demand, when you have extracted half the resource, you fall off the production curve as steeply as you went up. The production histories of the super giant oil fields follow Hubbert’s theory exactly. Hubbert projected that the world would hit peak oil about now. If he is correct, you can expect oil prices to rise sharply. The International Energy Agency recently warned to expect significant oil constraints within two years. Peak oil, if it is real, will have negative consequences on our economy, and make a transition to energy efficiency and renewable energy even more urgent.

The best way to get off oil is through making cars dramatically more efficient. Only four nations in the world produce more heat-trapping carbon dioxide than the US vehicle fleet. After the 1979 oil embargo we cut oil use by 15% just through better vehicle standards as we grew the economy 16%. We can do that again. We know how to make cars that get 60, 70, even 100 miles a gallon. They are on the roads in Europe now, and all the major car companies have programs along these lines.
We also know how to make biofuels. It is critically important, however, that the biofuel feedstock is sustainable. Corn ethanol can be seen as a transitional step to cellulosic ethanol from wastes, but as practiced now it is wholly unsustainable. The way we grow corn is unsustainable, and the subsidies are driving inefficient processes. At Iowa State University, however, the Bioeconomy program has shown how to supply sustainable feedstocks, efficiently coproduce ethanol and biodiesel and then use it in very efficient cars. Again, whole systems thinking can solve the problem.

We have all the technologies that we need to make the transition to a new energy economy and it is happening. Fifteen gigawatts of new wind power were brought online in the U.S. last year. In good sites, wind comes on cheaper than running an existing power plant. Solar is also growing rapidly.

Germany has pledged to become 100% renewably powered by 2050. Denmark plans to get 60% of its energy from renewable sources by 2010. Americans are less aggressive, but some states are setting renewables goals. Illinois plans to get 8% of its energy from renewables by 2013 and Colorado has a commitment to be 20% renewable by 2020 and 25% by 2025. Alameda County, in California, recently commissioned a 2.3-megawatt solar array that saved $700,000 a year.

Implementing eco-efficiency and renewable energy is a great first step, but it is only the beginning of the transition to a sustainable economy. We also need to redesign how we make and deliver all products and manage all institutions to be restorative of the human and natural capital that is now in short supply.

In her book, *Biomimicry*, Janine Benyus asks how nature does business. Nature doesn’t run on big energy flows, it uses sunlight. Nature makes nothing persistently toxic and makes everything near to something that’s alive at room temperature. Nature also produces no waste, using the output of any process as food for another process. And nature shops locally.

Consider the abalone. It creates an inner shell by excreting proteins that create an electrically charged framework on which seawater deposits minerals at the molecular level. The resulting shell is twice as tough as the best ceramics we make in very high temperature kilns—all accomplished in ambient temperature with zero waste. Sandia Labs mimicked the abalone, using an electrically charged substrate, dipped in alternating baths of calcium carbonate and polymer to self-assemble a break-proof substance just the way the abalone makes it. This is the future of industry, creating superior products using processes that are clean by design, safe, waste free and cost effective.

According to Homeland Security, sewage treatment plants are possible terrorist targets because of their chlorine inventories. In Burlington, Vermont, Dr. John Todd built an EcoMachine™ sewage treatment plant that looks like a greenhouse because that’s what it is. It uses organisms taken from nature to do what they do, detoxify the waste stream. Such biologically based treatment plants have been installed in Body Shop boutiques and the new Environmental Studies building at Oberlin College.
David Orr, a leading environmental educator, says the crisis we face is first and foremost one of the mind, perception and values. By the time you conceive of a product or a process you have committed 80-90% of the lifetime cost of that thing. Whole systems thinking is perhaps the most valuable thing we can learn to help reduce those costs.

Thirty years ago the European analyst, Walter Stahel, showed how his Cradle-to-Cradle economy could implement such whole systems thinking. Some of the concepts from Stahel’s work are:

- Greater durability
- Minimum-materials design and manufacturing
- Recovery of scrap
- Repair and reuse remanufacturing
- Recycling
- Downcycling

Stahel showed that 75% of industrial energy use is due to the mining or production of such basic materials as steel and cement, while only about 25% is used to make the materials into finished goods like machines or buildings. The converse relationship holds for human labor: three times as much labor is used to convert materials into higher value-added products as in the original mining. He suggested that increasing the kinds of businesses that recondition old equipment as opposed to those that convert virgin resources into new goods would substitute labor for energy. Such work could be conducted in small workshops around the country where the products that needed rebuilding are located—something like car repair shops that are located in every village. This sort of job creation addresses both unemployment and resource waste.

Is there a business case for sustainability? Yes, and you ignore it at your peril! Smart businesses are recognizing that managing to an “integrated bottom line,” is simply better business than focusing either on the single bottom line or the “Triple Bottom Line.” Behaving responsibly enhances every aspect of shareholder value. Cutting waste enables companies to achieve outstanding financial performance. It:

- Cuts costs, which enhances profitability, adding to the bottom line or the top line
- Reduces risk, and by preserving the franchise to operate, might even keep you in business
- Attracts and retains the best employees
- Increases worker productivity and helps keep workers healthier
- Drives innovation
- Increases market share
- Better manages supply chains
- Reduces the cost of distrust. In an Internet empowered world, people who don’t like something that a company does won’t shop there.

The companies that get it right will be first to the future. Throughout history, there have been waves of innovation. In the first industrial revolution we invented commerce with technologies like water-power and textiles, and then moved on to steam power and trains and steel, and then electricity and chemicals and cars, and then
The last wave of innovation was the IT revolution. What is going to underpin the economy of the future? In an age of globalization, if America wishes to retain a dynamic growing industrial economy, we would do well to concentrate on the technologies of the future: biomimicry, resource productivity, renewable energy, green chemistry, and other ways to meet human needs sustainably.

Sustainability pays. The companies on the Dow Jones Sustainability Index are outperforming the general market. Goldman Sachs released a report in 2007 showing that the companies that are the leaders in environment, social, and good governance policies have 25% higher stock value. Almost 90% of CEOs from most of the world’s developed countries think sustainability is a key to their profitability and will be an even more important issue five years from now.

We don’t have all the answers, but companies who are asking how they can become more sustainable are finding them. The three principles that make up Natural Capitalism offer the basis of the solution:

- Buy time, pushing off the drivers of change, by using everything dramatically more efficiently
- Redesign how we make everything by using approaches like whole system design, Cradle-to-Cradle and Biomimicry
- Manage so we are restorative of human and natural capital

These concepts can be the basis of global competitive advantage and our economic success in the future.

L. Hunter Lovins is President and founder of the Natural Capitalism Solutions. In partnership with leading thinkers and implementers, NCS creates innovative, practical tools and strategies to enable companies, communities and countries to become more sustainable.

Recipient of such honors as the Right Livelihood Award, Lindbergh Award and Leadership in Business, she was named Time Magazine 2000 Hero of the Planet. She has co-authored nine books and hundreds of papers, including the 1999 book, Natural Capitalism and 2006 Climate Protection Manual for Cities. She has served on the boards of governments, not for profit, and for profit companies.

Hunter’s areas of expertise include Natural Capitalism, sustainable development, globalization, energy and resource policy, economic development, climate change, land management, and fire rescue and emergency medicine. She developed the Economic Renewal Project and helped write many of its manuals on sustainable community economic development. She is currently a founding Professor of Business at Presidio School of Management, one of the first accredited programs offering an MBA in Sustainable Management.

This article is drawn from a keynote presentation made by Hunter Lovins at the Association for Manufacturing Excellence (AME) Annual Conference in Chicago on November 1, 2007.
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