

# Knowledge Management Based on your Organization's Approach to Life: Operational Excellence

*OE networks, metrics, and more; second in a series.*

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and Bill Baker

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**I**n *The Discipline of Market Leaders: Choose Your Customers, Narrow Your Focus, Dominate Your Market* (Addison-Wesley, 1995) authors Michael Treacy and Fred Wiersema argued that market leaders focus on a single, unifying, and compelling value proposition for their customers. Based upon their research they found that value propositions clustered into three distinct categories:

1. **Operational excellence** is giving customers the best value. Those using this discipline reduce costs and increase efficiency. One example is Wal-mart, whose business model is based upon a superlative grasp of logistics that enables them to keep costs low.
2. **Customer intimacy** is providing customers with tailored products and services. While these products and services may not be the cheapest available, they should be the ones which best provide

what the customer wants and needs. Ritz-Carlton, which keeps a file containing personal preferences of customers, is an example.

3. **Product leadership** is producing innovative products, trusting that customers will flock to the newest and best. Intel and other chip manufacturers rely on this strategy.

## **In Brief**

The Knowledge Management approach to achieving Operational Excellence (OE) is needed to achieve six sigma excellence and thus greater efficiency in processes, as highlighted in this article. Without six sigma performance, a company may spend significantly more cost on repairs and rework, just to prevent defects from escaping to their customer's back dock. With such costs, you cannot deliver lower-priced, competitive products. ChevronTexaco, Raytheon, and other examples reflect effective strategies to build and sustain top OE performance as well as competitiveness.

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This article will concentrate on the Operational Excellence (OE) approach, which highlights the need to achieve six sigma excellence and thus greater efficiency in your processes. In fact, the well worn quote, "A four sigma company cannot compete with a six sigma company," is a truism. The four sigma company may be spending 20-25 percent more cost on repairs and rework, just to prevent defects from escaping to their customer's back dock. With such costs, you cannot deliver lower-priced, competitive products.

In a commodity market, low price is paramount and is a never-ending journey based on cost, quality, and safety. In the early Total Quality Management days of the 1980s and early 1990s this was a driving factor for survival and remains so today. Somewhere, however, high level quality products and services became the norm and are expected. Consumers who understand the positive customer experience with Disney World come to expect the same kind of treatment from Sears, for example. Such expectations cannot be met consistently without world-class OE performance.

### **ChevronTexaco's Knowledge Sharing for Operational Excellence**

ChevronTexaco has long focused on OE. While their fuel and lubricant products deliver high performance with unique additive technologies, the market looks for commodity prices. Consequently, it is extremely important that they be a low cost producer; they cannot afford incidents and rework. Additionally, the oil industry requires enormous capital investments. Increased efficiency quickly adds up to enormous savings. At the same time, however, safety and environmental concerns are the most critical focus.

Global enterprise excellence and shared learning combine to support OE, one of ChevronTexaco's critical business strategies. For ChevronTexaco employees, OE means building world-class performance in safety, health, environment, reliability, and efficiency. Objectives are to:

- Achieve an injury-free workplace
- Eliminate spills and environmental incidents. Identify and mitigate key environmental risks
- Promote a healthy workplace and mitigate significant health risks
- Operate incident free with industry-leading asset reliability
- Maximize the efficient use of resources and assets.

Safety is a shared value at ChevronTexaco. The organization wants people to go home safely every day. To deliver and sustain high levels of performance, management must engage employees throughout the organization to develop a culture where everyone believes that all accidents are preventable and that "zero incidents" is possible.

Management believes it can also improve upon high reliability by avoiding unplanned events, continuing to reduce disruptions from external events, and even more effectively scheduling and optimizing planned downtime. This requires an understanding of critical systems, processes, and the people involved in them to identify recurring problems, their root causes, and corrective measures. With similar operations in place around the globe, quickly sharing and leveraging information can have a very positive impact on the business.

For effective global knowledge-sharing, ChevronTexaco is designing processes, recognizing and rewarding behaviors, and using enabling technology to deliver successful practices, lessons learned, and answers to questions where and when they are needed. Before describing the structure of these networks, let's take a look at some typical examples that illustrate the value of shared learning.

### **Value of Knowledge Sharing in Chevron Texaco**

Cost and time savings were captured during the solution of a recent weather-induced problem in one of ChevronTexaco's processing units. A lightning strike caused problems with instrumentation that led to a higher feed input and resulted in sooting of

the catalyst bed. The unit's engineer looked for suggestions to remove the soot and reduce the resulting pressure drop by posting a question in GRKM (the global refining KM website). By the time he got to work the next day, he had received four replies from an operations superintendent, a process engineer, a process advisor, and a process technical expert in four different locations. Based on their feedback, he had a workable plan to correct the problem and reuse the catalyst. This saved over \$100,000 and at least a day of his time trying to research the problem.

Network-enabled rapid communication provides an example of the potential value of sharing lessons learned. One of ChevronTexaco's business units (BU) received an incident report from a partner operating an oil field. While completing a well, a service contractor was preparing a perforating gun, which is used to shoot holes in the well casing to allow for gas production. An electrical problem caused the gun to fire prematurely, resulting in significant damage to the well. Three people in the BU immediately entered the report into both the Drilling and Completions and the Formation Evaluation email networks. Several hundred operating and technical staff received the report, including two well logging specialists. Aware that the same type of job was planned at another location, they contacted an employee at that unit who stopped the perforating operation and did not reschedule the work until his team could address all issues. It took just four days between the incident and the report being used half a world away, potentially saving \$30 million.

The proactive sharing of successful practices also provides potential value. A catalytic process unit was experiencing fouling of a wet gas compressor. The process team tried an on-line water washing procedure that hadn't been used before. The procedure successfully removed the fouling and avoided a costly shutdown. When submitting their practice to the network, the team estimated the potential savings for reuse at \$500,000 and over 80 hours of labor. The unit's engineer com-

mented, "I especially like the global aspect of GRKM. I'm very used to sharing info with the U.S. refineries but this really has opened the door to contacts around the world".

An example of sharing between diverse business operations took place when the project team for a new offshore oil platform being constructed for a field in West Africa needed world-class operating and maintenance practices for their control room. Team members attended a worldwide operations networking forum where they learned about similar processes in a refinery. This led to significant cost savings when the project team then visited the refinery and was able to identify several cost saving and efficiency-improving practices that they could adopt. Examples of "transferable" practices included control system graphics, a control room operator screening tool, and the refinery's reliability-centered maintenance concepts to identify platform operating and maintenance processes. The project team is also seeking ways to use refinery staff to help with training for future platform control room operators, craft team leaders, and operations planners.

Safety networks provide a facilitated Quality Fitness Review (QFR) to help business units develop action plans for improving their OE performance. During this two day session, network core team members help business unit leadership and other personnel responsible for managing the relevant focus area to identify improvement opportunities, develop prioritized action plans to close performance gaps, and increase alignment around the improvement efforts. A reliability improvement network sponsors pilots that help business units apply the Reliability Opportunity Identification (ROI) process to recognize prospects for reliability improvement. Initial pilots have identified multi-million dollar cost-saving opportunities.

Other examples of global collaboration and problem-solving include:

- Liquid sulfur had accumulated in the pilot gun of a reaction furnace. The crew had not seen this happen before and

**Five strategic networks have been created as part of ChevronTexaco's focus on safety ...**

asked for help on a root cause analysis as well as suggestions for preventive actions. Within a few days they received information from four different refineries that helped them modify their operating procedure.

- One refinery had a plant shutdown during a power disruption. The process engineer received a number of good ideas for future implementation from global peers and avoided the cost of a study by an engineering firm.
- A refinery engineer needed to isolate a unit by freezing a water cooling line but had never done this before. Answers provided from the reliability-focused maintenance network gave her the information to tackle the procedure with confidence. The collection of freezing procedures was also documented for future application by the network leader.
- A refinery engineer requested tips for safely cleaning a packed column in a unit scheduled for turnaround. Members of the reliability network shared information on fire and safety issues and updated guidelines for safe repair and cleanup of packed bed columns.

### **Role and Structure of Networks — ChevronTexaco**

As illustrated in these examples, networks are a critical component for connecting people, processes, and culture to achieve OE objectives. ChevronTexaco sponsors a number of global networks in areas such as health and safety, exploration and production, refining, and information technology. These networks have proliferated significantly since its recent merger as employees explore ways to integrate varied cultures, businesses, and work processes into a new, seamless organization of 53,000 employees operating in 180 countries.

Networks come in many different shapes and sizes. Informal networks that involve people with a common interest (typically called Communities of Practice — CoPs) are very popular but vary significantly in structure and/or responsibility. Groups that focus on critical competencies and

core processes use a more formal or "strategic" network structure. These networks have formal charters and annual operating plans, BU sponsors, selected leaders, and core team members with performance agreements, network funding, clear deliverables, and metrics. Regular teleconferences, workshops, and moderated collaborative websites are also part of the network operations. An online toolkit guides a group in the design, launch, and sustain phases of the network life cycle. The toolkit contains example documents and processes contributed by existing networks. Facilitators work with new networks to accelerate the design and launch phases. There are over 40 of these networks either launched or in design. This article provides a detailed description of these "strategic" networks.

### **Inside an OE Network**

Five strategic networks have been created as part of ChevronTexaco's focus on safety:

- *Motor Vehicle Safety (MVS)*: Vehicle crashes are the number one cause of work-related fatalities.
- *Contractor Safety Management (CSM)*: Contractors account for roughly two-thirds of the hours worked on the company's behalf and more than 80 percent of work-related fatalities.
- *Repetitive Stress Injury Prevention (RSIP)*: Computer-related repetitive stress injuries account for more than 20 percent of employee work-related incidents.
- *Reliability Improvement (RI)*: Design, operation, and maintenance of facilities to sustain mechanical integrity, provide personal safety, and prevent incidents are fundamental to business success.
- *OE Champions*: They provide the core of technical expertise in OE, facilitate deployment of the OE management system, and support BU leadership in achieving OE performance.

These networks started as traditional project teams chartered to develop guidelines to establish a consistent expectation and approach for addressing risks and

opportunities common to all ChevronTexaco organizations. As the project turns to deployment in the BUs, the project team is often no longer actively engaged. The company's Health, Environment, and Safety (HES) Steering Council realized that there was a continuing need to have a group to speed implementation and continually improve the recommendations and tools of the project team. The council transformed the project teams into networks, expanded them with members from many business units, and chartered them to: 1) provide rapid connection of people with questions to people with relevant knowledge and expertise; 2) enable and accelerate effective, efficient, and timely seeking, sharing, and adoption of value-adding practices, lessons learned, and new technologies; 3) reduce the likelihood for repetition of mistakes; 4) provide a link to internal and external information sources such as databases, previous studies, and benchmarking data; and 5) enhance knowledge retention within ChevronTexaco.

Mid-level management support and sponsorship are critical to a network's success. They work with subject matter experts to develop the business case, nominate a sponsor, help select a leader and core team members, collaborate with the network leaders on the charter and operating plan, review progress periodically, and engage peer management to make sure the right people are active network members.

Each network also has a senior executive sponsor who helps establish vision, strategic goals, and expected value for the business; assists with acquiring resources and funding; and looks for ways to gain visibility for and promote the value of the network.

Each network's charter and annual operating plan contains these elements: 1) purpose, scope, and business case; 2) network goals and deliverables; 3) roles, responsibilities, and expected time commitment; 4) network membership and typical member profile; 5) governance; 6) budget; 7) metrics (process, behavior, and results measures); and 8) schedule of activities (monthly teleconferences, workshops, progress reviews).

For example, the Contractor Safety Management (CSM) network has short-term goals focusing on communication and implementation support: Share successful practices, lessons learned, and challenges faced; educate business units about CSM Team deliverables; assist BUs with deployment plans (implementation, logistics); develop fluency in operating the network; and provide network access to external contractors.

To sustain world-class performance in contractor safety, the network has longer-term goals focusing on understanding gaps and problems as well as improving practices: Maintain and develop standards over time; proactively identify gaps in the system, develop and communicate new practices; develop leading indicators that are predictive of success in the lagging indicators; identify what is not working for BUs and contractors; improve implementation effectiveness (collect root cause data for incidents and analyze to understand the real problems; based on analysis of metrics, develop solutions to reduce incidents or their severity); and identify, validate, transfer, and apply new ideas, innovations, and technologies.

### **ChevronTexaco's OE Network Metrics, Teleconferences**

The OE network's main objective is to help business units close performance gaps and meet corporate expectations. Metrics that serve as leading indicators of corporate safety performance will help the networks adjust focus or guide members to practical intervention. Since explicit results will take time to materialize, the network also has measures for process and behavior (see Figure 1).

Monthly teleconferences are an important part of the network's practice. A typical two hour agenda covers: corporate safety performance and network metrics reviews; sharing a serious incident with root cause and actions taken; focused topics (discussion on developments on a key deliverable); successful practice sharing (presented by a BU network member); and

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## Measures for OE Networks (ChevronTexaco)

### Results

- List of estimated benefits (members describe benefits gained as a result of implementation of a program, use of a tool, or development of a new practice)
- Pilot project reports (engagements with BUs to create an implementation action plan)
- Top three shared ideas or improvements each quarter

### Process

- Percentage of BUs using the network's tools and guidelines
- Number of pilot programs
- Number of discussions between network members and BU leadership
- Survey of perceived value of networks by members and stakeholders

### Behavior

- Participation statistics (number of members, number of conference calls, and number of BUs on conference call)
- Website usage statistics (items shared, documents read, questions asked and answered).

Figure 1.

open dialogue/questions and answers (share successes, ask for and offer help).

The core team meets prior to the general membership teleconference to plan the agenda and solicit contributions. The core team also conducts occasional one-on-one interviews of members to better understand their issues and interests as well as to collect metric information on the use of the recommended guidelines and tools. Each network is supported by a collaborative website open to all employees that is used to publish successful practices, discuss issues, ask and answer questions, post meeting agendas and pre-reading, track actions and retain guidance, tools, and other subject matter specific documentation.

### **Network Success Factors**

Critical success factors for networks include clear business value, effective network leaders, and management support (including funding). For the OE networks, senior management support was the critical first step. Management initially identified the need for the networks and contin-

ues to champion them. Since these networks supported a strategic business goal and had specific deliverables, funding for time spent by the moderator (a 25-50 percent commitment during the initial network phases) and billable core team experts was justified. Network members were selected by their local management with an expectation to make participation a part of their job. The networks adapted readily available and inexpensive corporate web tools to facilitate collaboration and sharing.

### **ChevronTexaco's Other Networks — Exploration and Production (Upstream)**

"Seek, Share, and Adopt" is the mantra of Technology Rapid Execution (TREx) networks that help ChevronTexaco's exploration and production (upstream) business units develop effective technology investment strategies and solve day-to-day operating problems. Capital and operating costs for the front end of our value chain are tremendous. This provides a large incentive

for technical and operations staff to connect and transfer knowledge on cost-saving and performance-improving technology innovations.

Across upstream, 23 technical networks have been created. Once an opportunity is identified, network members are able to efficiently seek input and share experiences (good and bad) in order to speed up the adoption of effective, proven practices broadly across the entire company. Global communication is facilitated by network email, web-based portal and other tools, contact lists, and occasional in-person workshops.

Each TREx network is aligned with a Focus Area such as: exploration, reservoir management, well systems, facilities and operations, or health, safety, and environment. In addition to these functional Focus Areas, there are also three asset-based Focus Areas (Gas, Deepwater Development, and Heavy Oil) and two transformative technology-based Focus Areas for a total of ten.

The Focus Areas provide a framework for operating BUs and technology companies to identify and prioritize common challenges that can then be addressed with a technology investment strategy. Each Focus Area has a dedicated leader and set of Technology Management Team members who collaborate on a regular basis. This team's recommendations are then reviewed by a small set of senior managers from operating BUs and the technology company who then have the responsibility to endorse technology strategies and approve resources for technology development projects.

Each TREx network has a leader, a group of six to ten core members, and several hundred members from across all of the operating units around the world. Two-thirds of the core team members work in operating units with the remaining one-third in the technology company. This significant participation from operations helps ensure the topics being discussed are business related and that the tools developed are accessible. With network members working in such varied locations as 100

miles offshore on a drilling rig to a field office in the jungles of Indonesia, it is critical that access to the networks not be solely dependent high speed, high band-width internal networks. TREx networks use a variety of tools to allow users the opportunity to gain access in the most efficient manner from whatever location they are working.

### ***Other Networks — Global Refining***

"Quality Answers in Minutes Not Days" is one mantra of Global Refining Knowledge Management (GRKM). Prior to the merger, Chevron had created a number of best practice teams that recommended process equipment, process operating improvements, and shared subject matter expertise for its U.S.-based refineries. The merger more than doubled the number of refineries in the system, with all the additions located outside the United States. In addition to expanding the best practice teams, ChevronTexaco realized that the new refineries were not familiar with and had difficulty reaching technical experts.

The Refining leadership team championed the development of a new global network to connect technical experts, refinery engineers, and operators to enable them to search for answers or ask questions concerning day-to-day operating problems, to share successful practices, and to find a wide variety of refining knowledge in a single location. To ensure quick response to urgent questions, the web-based "portal" features an email-enabled process that directs questions to a subset of over 900 members who have registered their willingness to provide answers in a few of over 200 subject categories. Usually a question receives four or five responses within 24 hours. But if no answer is submitted, the question is escalated to technical experts who are responsible for the subject area.

In the past few months ChevronTexaco has documented many similar examples that have contributed to operational excellence with multi-million dollar cost savings and avoidance of incidents and lost production.

**Another method to transfer knowledge in the design phase is through the Integrated Product Team (IPT) approach.**

**Challenges and Next Steps:  
ChevronTexaco**

Although many of these ChevronTexaco networks are new, they are already making significant contributions to operational excellence. Gaps still exist in the participation level and accountability of members, in reinforcement by senior management, and in the engagement of affected business units. Some of the KM opportunities identified within ChevronTexaco are:

- *Documenting and communicating network successes:* Many networks have metrics that include reporting successes involving knowledge transfer; thus data is being collected today. Management is encouraged to sponsor a network to find opportunities to tell those stories at management and employee meetings. Opportunities to publish the stories on the corporate intranet are continually being sought.
- *Improving the skills of our network leaders:* Two objectives are planned for 2004. One is the network of network leaders. The second is to develop a practical curriculum for running virtual teams and networks.
- *Encouraging and reinforcing members' use of networks as a part their normal work process:* This requires more communication of network successes — especially stories of how someone was helped in their job assignment and recognition of those involved (from peers and from management).
- *Educating senior management on the important role of networks for short-term (improving OE) as well as long-term (retention and knowledge transfer to new employees as senior staff begins to retire) benefits:* The network value proposition for OE, TReX, and Global Refining is well understood by senior management sponsors. They have a responsibility to communicate the successes broadly to peers and throughout affected parts of the business to encourage more active participation.

**KM as a Design Tool**

Consider another aspect to knowledge sharing as a means to improve your organization's OE. While knowledge sharing may have started on the shop floor with the obvious needs of how to install rivets on WWII airplanes, it is now considered a valuable tool to assist knowledge workers across the enterprise from the board room to strategic planning groups, to the business leaders and also engineers who design the products.

The Design for Six Sigma (DFSS) process that is being adopted in many companies is intended to impact operational excellence in the design phase. We have known for years that the design phase determines 70-80 percent of the eventual product cost. With guidelines for design engineers, we can now limit downstream low yields, reducing variability and the high cost that has often been locked in by the time a new product got to manufacturing. DFSS provides new guidance and alternative approaches to "throwing the design over the wall" to manufacturing — traditionally the fate and life-defining events inherited by the manufacturing manager. The embedded knowledge in the DFSS process becomes an intellectual asset of the organization that can be systematically built into the design engineer's toolbox.

Another method to transfer knowledge in the design phase is through the Integrated Product Team (IPT) approach. Many companies establish IPTs at the beginning of a project to use a team collaborative approach for product design by including a cross-functional aspect. By involving manufacturing, process, reliability, and quality managers as well as suppliers and customers in the design team, we can leverage all their knowledge toward a common and the "best of the best" knowledge-based solution. This approach tends to work well when properly facilitated and also speeds up decision making, since both customers and suppliers are part of the IPT. Decisions can be made in parallel rather than in series through typical bureaucratic arms-length communications.



Although there was initial concern about involving customers in product development at Raytheon, customer involvement has proved very beneficial and has been a true asset. While engineers have tended, in the past, to want to deliver the 100 percent perfect solution in a sparkling clean environment, the IPT process airs out all dirty laundry, so to speak, and the collaboration can build confidence. This barrier has to be addressed and overcome so all that participants feel comfortable. In other words, back to the basic tenet of knowledge sharing and reuse: Mutual trust has to exist for knowledge sharing and reuse to flourish. And guess what? It also generates customer and supplier satisfaction!

### **Raytheon: A Blended KM Approach**

When pursuing an OE approach, an organization must have a view of what it wants to be. This can be done via use of the published models of excellence that include the Malcolm Baldrige National Quality Award, the ISO 9000 series of criteria, the Shingo Prize criteria, a lean Six Sigma approach, or a customized version that the organization created. In any event, there must be a visionary goal to energize employees and managers and set benchmark targets.

OE, by definition, focuses on better performance than your competitors, thereby allowing lower prices and more value for the customer's dollar. It can also mean shorter operational cycle times so that delivery is shorter and more responsive to customer needs. To work operational excellence as a prime focus, organizations tend to devote their assets to reducing operational cycle time and defect reduction.

The two key strategic tools to achieve these ends are lean enterprise as extolled by Jim Womack and Dan Jones in the recent bestseller, *Lean Thinking*, and in Womack's breakthrough book, *The Machine That Changed the World: The Story of Lean Production* — the process defined by Motorola and "reformulated" by Texas Instruments, Allied Signal (now Honeywell),

GE, and Raytheon among others. Both of these approaches are excellent and when combined into a Lean Sigma framework, they form a powerful set of change management tools and infrastructure.

Raytheon has combined these lean and Six Sigma principles in "Raytheon Six Sigma™" R6<sup>σ</sup>™ and trained executives, mid-level managers, and most of its 76,000 employees in the use of improvement tools and how to execute a change process that produces positive results and value. KM tools apply here as Raytheon has leveraged the best practices and lessons learned across multiple projects, businesses, technologies, and geographical locations.

They formed a Knowledge Management (KM) Strategy driven by a network of KM focal points in each business called KM Champions. The KM Champion's job is to help connect people with knowledge both in databases and in other networks including subject matter experts and CoPs. They conduct an annual R6<sup>σ</sup>™ Celebration that highlights nominated projects, several which are selected for the Chairman's Award. The improvement knowledge is shared among all employees as a job well done from year to year. This past year, 27 projects were nominated from the businesses and seven R6<sup>σ</sup>™ project teams received the Chairman's Award including trophies and a photo opportunity with the chairman in front of the 500 people present.

Raytheon and other organizations have learned that KM principles can be applied project by project and site-by-site, so local change agents can take ownership and make big contributions that generate value for the customer and company ... savings in time and cost. This project and site improvement approach, however, generates opportunities for the "right hand does not know what the left hand is doing." This is where effective KM approaches can provide the vehicle to span the projects and sites to share and reuse solutions and leverage corporate knowledge. CoPs, lessons learned databases, portal technology, and knowledge sharing forums all can help build a sharing-learning environment in organizations. Both explicit and tacit

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knowledge must be easily accessible and must be an expectation of the culture to generate repetitive knowledge sharing.

## **Conclusion**

A key tenet of the market disciplines approach is that an organization can only excel in one value proposition. As Treacy and Wiersema put it, "... no company can be the best at everything." Nevertheless, it is also true that companies must also perform reasonably well in the other disciplines. Regardless of the value proposition of your company, you need to be aware of the other two and dedicate resources to them. We will cover the other two approaches, customer intimacy and product innovation, in upcoming articles.

**Authors' notes:** Thanks to ChevronTexaco employees Ken Sample (Focus Area Manager), John Wolff (OE Network Leader), Bonnie Walshe (Global Refining Knowledge Manager), Guy Gimlen (Global Refining Reliability Network Leader), Joe Mudnich (Corporate Public Affairs), Greta Mayfield (ITC Communications Coordinator), and Jeff Moore (Corporate Public Affairs) for their comments and shared examples of network success stories. In achieving operational excellence in manufacturing, the Association of Manufacturing Excellence (AME) has been a leader in the sharing of best practices across organizations and industries with an eye to process management and cost reduction. Some of the best practices shared through AME are the principles that are now well accepted as an effective, efficient way to do our job: Just in Time, Kanban, error proofing, the visual factory, teaming, and the Toyota Production System principles that have evolved to the Lean Enterprise strategy. The most recent AME Conference in 2003 featured Lean Leadership and attracted approximately 1500 attendees focused on achieving operational excellence.

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