TMG News

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"Sharing Information to Improve Reliability"

Making the Move Toward a Learning Organization: A Classic Journey of Change

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Learning from experience: most of us would agree that it's the best way to learn, as it creates a deeper, more memorable understanding. Unfortunately, it can be a very expensive way to learn — unless you can benefit from the experience of others.

In the last decade, I have observed thousands of employees at every level of responsibility gain a better understanding of how their role fits into and affects the manufacturing operation of their plant, through the use of a game designed to change the way workers view and perform their jobs. Since the first game at DuPont, more than 20,000 workers at over 80 companies worldwide have participated in The Manufacturing Game® workshops. What we've seen over this time is that one key factor in the framework for true, large-scale organizational change mirrors the classic Hero's Journey, so well documented in historical studies, popular culture and psychology.

In a nutshell, the Hero's Journey is a personal journey of learning, moving through three stages, facing obstacles and challenges along the way, and breaking through two thresholds to reach the end. To be successful, a person or organization must master each of the stages and cross the thresholds.

Erich Jantsch, author of ***Design for Evolution***, proposed that the reason the Hero's Journey is so prevalent in mythology is that it represents the human experience of participating in an evolution to a higher state.

The Framework for Change

The Hero's Journey itself is not the silver bullet for sweeping organizational change. However, when combined with the traditional framework for organizational change created by Kurt Lewin in 1952, the result is a series of processes that can help an organization break through a crisis to the next level of excellence.

Lewin said that changing an organization requires three steps: an action to unfreeze the organization and make it open for change, an action to implement change and finally, an action to make the change sustainable, or refreeze, in the new mode.

Many times, the action that unfreezes an organization is a crisis. Most workers are reluctant to impose change upon themselves, without a good reason – so when a crisis occurs, people are forced to recognize the need for change.

If the crisis is a clear and present danger, the fight-or-flight instinct kicks in and becomes the motivation for change. People either try to change things to eliminate the crisis, or they flee – flee involvement in the crisis, flee the department, or leave the company altogether. Any of these actions unfreeze the organization and create the opportunity to go to the next stage of the change.

Leadership at Every Level

The second process, to create success in stage two where the change must happen, is the

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Premcor Refines its Formula for Success

With 2001 sales of more than $6 billion and a combined crude oil throughput capacity of 420,000 barrels per day, Premcor, Inc. is one of the largest independent refiners of petroleum products in the United States. As the company expanded operations with the purchase of the former British Petroleum plant in Lima, Ohio in 1998, it was also looking to improve reliability at other key refineries. Premcor was aware of the critical role The Manufacturing Game® played in the turn-around of the BP Lima plant and decided to test the Game at two refineries. The results are in – and have been dramatic for each refinery.

Hartford: Dozens of Teams Take Action

Premcor's Hartford refinery has a daily capacity of 68,000 barrels. In November of 2001, TMG was introduced; that next month, the plant became certified to run its own in-house workshops. After a February 28, 2002 closure announcement was made, the focus shifted to concentrate primarily on safety, reliability and environmental issues for the remaining workshops.

In one of the very first workshops, an Action Team was formed to correct a problem with fluoride breaking through the alumina treaters in the alkylation unit, which makes high-octane gasoline. The team members were Rick Collins, Greg Sullivan, Gene Manley, Mike Eales, Charlie Russell, Randy Smith, Tom Neer, Cuong Le, and Cory Simmons.

The Alky unit had fluoride break-through from the alumina treaters to the FCC-DIB, (Fluid Catalytic Cracking Unit, a gasoline producer. A DIB separates normal butanes and ISO butanes). This costly event occurred twice, with the resulting total production loss of $40,000 and a total repair cost of $120,000.

The Action Team went to work, researching the problem to find the root cause. Their goal was to not just find and fix the source of the break-through, but to improve the flow process in order to eliminate production losses.

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What's Inside?

Public Workshop Calendar

Throughout the year, The Manufacturing Game® holds workshops for the general public at various universities and/or professional organizations across the country.

8 October 2002
Productivity, Inc. 7th Annual Conference on Lean Management
Orlando, FL
For more information and registration, please visit http://www.productivityinc.com

30 October 2002
SMRP 10th Annual Conference
Nashville, TN
For more information and registration, please visit http://www.smrp.org/events/index.html

Public Workshop
United Kingdom
25-26 November 2002
For more information about this UK workshop, contact Andrew Fraser at ACFraser01@aol.com

Other workshops for 2002 may be announced at a later date. Please check our Web site at *http://www.manufacturinggame.com* for registration details and frequent updates

Please check the Project Value Game® Web site at ***http://www.practicefields.com/pvg.html*** for information and updates.

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leadership process. The best process for leadership that we have seen is one based on a framework articulated by Peter Senge in his book ***The Dance of Change***.

In Senge's framework, three types of leaders are identified. Executive leaders who provide the resources for the change, operational leaders who provide the workers time and motivation to make changes and network leaders who find and refine ideas to accomplish the changes. Each of these leaders has a unique source of power.

While authority is the source of power behind the executive leadership role, the operational leaders get their power from the control of people's time, and network leaders get their power from the ideas they bring to the workplace. We also have found that these three leadership roles can be played by any of the members of an organization in varying degrees.

Using Power to Improve Reliability

To effectively use these powers to improve reliability, we found that there are three processes needed to achieve successful organizational improvement:

- A bottom-up process to tap the power of the workers.
- A leadership process to synchronize the three powers.
- A business-driven process to implement changes

Finally, a planning and adjustment structure is needed to anticipate and deal with the hazards along the journey to higher ground.

Of course, The Manufacturing Game® workshops simply start the cultural change to proactivity. The leadership process along with the idea implementation process is necessary to sustain the effort for defect elimination long enough and deep enough to make the new levels of performance sustainable.

The Final Threshold: Enduring Change

Creating order is the most difficult stage of the journey to achieve, as we have found that many change efforts fail to be sustained for the long term.

In order to complete a process of change, it is necessary to be attached to a larger trend that is already happening, or about to happen, in your organization or the world at large. A change will not be self-sustaining if the leadership process has to continue to support it to survive. The leadership process is to support change, not to keep order, which is the work of management. The new way needs to be part of the new natural order of things. Therefore, it is necessary to tailor the change to fit into the larger change that is happening.

At this point, another barrier must be crossed with the help of this larger change. One of the difficult parts of this transition is that an organization must abandon some of the processes and practices that have been very successful to this point. Those things were about change and now it is important to create order again. In our case, defect elimination is stressed through the cross-functional action teams. We think that something like defect avoidance through good work routines and decisions is one of the necessary ingredients in this final stage.

We now have to create good systems to anticipate defect production and good attention focusing processes to be able to see which routines will avoid the production of defects at the root. In general, we want to create systems where the "path of least resistance" leads to the proper routine.

We must also recognize that these systems will need to be renewed in the future as circumstances change. For this to happen, good frameworks and a test ground to validate the effectiveness of the change must be in place. The Hero's Journey framework and simulators, such as our game are a good way to test the new changes and to give people an experience of the new change.

We now understand some of the relationships in these frameworks and are discovering, along with our clients, ways to help the processes succeed. We believe that the key is to learn from your own experience as well as the experiences of others. We believe this is the essence of becoming a learning organization; a state that many organizations are striving to achieve today.

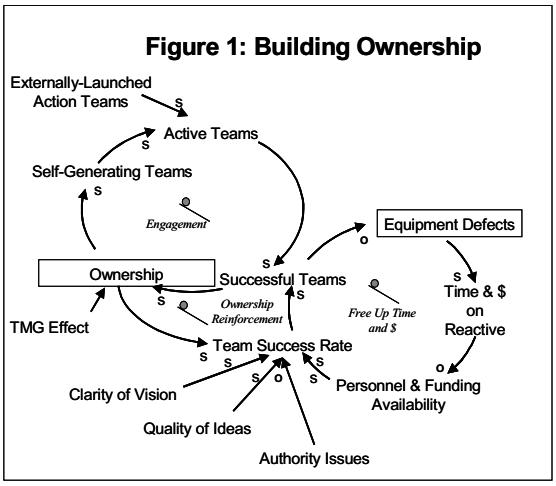
To share your company's action team successes for possible publication in future newsletters, please e-mail Mary Payne at MaryIPayne@mfg-game.com.

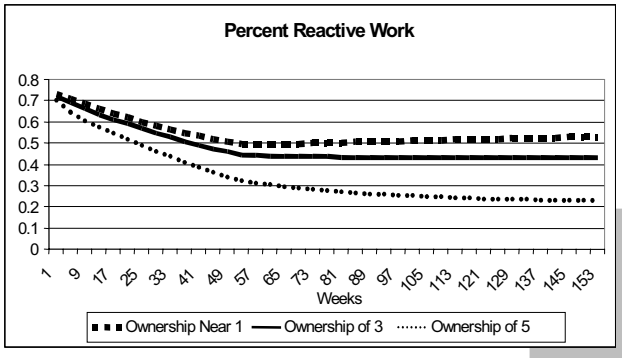
Building Ownership Is the Key

In the June 2002 Issue of ***TMG News***, we gave an overview of our new Dynamic Benchmarking model, with the promise of more in-depth explanation. This article will be the first of several that delve into the key learnings from that effort.

One of the things that makes this model distinctive is the inclusion of the actions and behaviors of the people in the organization as well as the equipment with which they work. A major finding from this renewed modeling effort is that the level of ownership felt by the employees is the most important factor driving performance. All of the technical tools to increase reliability alone are not sufficient to improve the performance of the plant. It is the use of these tools by the employees that achieves the results. If no one has the will to use the tools on a daily basis, the reliability will go down.

Figure 1: Building Ownership





Since finding root causes and many other behavior changes required for performance improvement are dependent on ownership, it is important to understand where ownership comes from. Ownership is defined as peoples' willingness to initiate and participate in proactive improvements. Many things can improve or diminish ownership including trust between management and hourly workers, clarity of goals, and authority to make changes. In our experience, nothing breeds ownership better than a combination of engagement and success. Action teams focused on eliminating small but nagging defects, give people a chance to get engaged and make a difference. When teams are successful, two things happen. As seen in the "Engagement" loop in Figure 1, success in eliminating a defect drives ownership. People who taste some success are typically hungry for more. This leads to further self-generated actions and more success.

Success also leads to fewer defects, as shown in the "Free Up Time and $" loop, which reduces reactive work, freeing up personnel and money to be applied to other initiatives. Our model showed that the Net Present Value of having many teams to help in the elimination of defects was worth $60 million over three years in one case. The number of teams required to achieve this level of performance is about 1 team for every 5 employees per year. Since we recommend that cross-functional teams should have 4 to 9 employees, this amounts to every employee being on a team each of the first three years.

In conducting a benchmark at a site, we get data for ownership by surveying the organization, and typically we ask about ownership across functional lines. So we have the operations department rate maintenance ownership and vice versa. The survey instrument rates ownership on a 0-5 scale. For example, an operations department with a rating of 0 for ownership would be described as:

> *Most personnel have a "check your brain at the gate" mentality; they typically actively resist change or will go along only grudgingly with direct requests for improvement. People believe that improvement is not part of their job.*

And a 5 would be:

> *Almost all personnel actively participate in improvement activities; they believe that it is not only part of their job to participate in activities but to initiate them.*

As an example, we ran the Dynamic Benchmark for a large manufacturing organization under 3 scenarios: an ownership level near 1 (their actual score), at 3, and at 5. Figure 2 shows that ownership drives reactive work down through more involvement in finding root causes and elimination of defects at their source. This results in lower cost and higher availability.

The value of getting from a 1 to a 5 on ownership was worth over $130 million over 3 years to this organization. In our work so far with the Dynamic Benchmarking model, this ownership effect is by far the most important and it is a key enabler of most other strategies.

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The team decided upon a two-pronged approach: first, the stop-gap measure of installing a $1,500 bubbler (tubing routed through a liquid solution which changes color when fluoride is detected) downstream of the first alumina treater, to give advance warning of a fluoride breakthrough. The bubbler did detect breakthrough prior to the lab implementing the second, more permanent solution — the purchase of a fluoride analyzer.

Since November of 1999, the existing air conditioning unit at the Hartford plant has failed repeatedly – and required approximately 20 service calls. A new Action Team went to work, charged with finding a solution for the temperamental system. The team members were Julie Breckle, David Webb, Dennis Goode, Judy Strain, Harold Schallenberg and Dennis Vineyard. They discovered the answer was easy to come by: since the unit was a decade old, it was time to replace it.

But the team went even further. In keeping with the tradition of "don't just fix it, improve it," Action Team members proposed recommendations to assure the reliability of the A/C unit. The recommendations in-

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cluded coating new condenser and evaporator coils with Heresite; converting the new system to a hot vapor bypass system to control loading of the compressor; and adding a short-cycling timer to prevent the compressor from restarts before the system equalizes, among others.

The team's foresight has paid off. Since installation, there have been no breakdowns or service calls. In just the short time since TMG was introduced to this plant, a total of 61 Action Teams have been launched, boasting a 60 percent success rate.

Port Arthur, Texas: The Reliability SWAT Team

Premcor's Port Arthur refinery has experienced dozens of successes since it first ran TMG in 1999 – so many, in fact, that a permanent Action Team was formed to focus on general equipment reliability issues for the crude complex.

The Equipment Reliability Action Team, or ERAT, went into action in September 2001. The team members are James Howard, John Farris, John Gobert, Pete Gray, Dolan Jones, Warren Scoggins, Bill Steinmetz, and Allan Thibodeaux. In its short history, ERAT's focus on general reliability has already saved tens of thousands of dollars in repair costs, as well as helping to identify underutilized resources.

For instance, the plant had been experiencing thrust bearing failures with the heavy vacuum gas oil (HVGO) pumps, or P-121s. Over an 18-month period, the failures due to high bearing temperatures, were costing upwards of $90,000 to fix.

ERAT's root cause analysis brought to light the necessity for lubrication system design changes to improve the bearing life of the pumps. New flow orifices were installed to evenly divide bearing lubrication flow be tween the turbine drivers and the pump thrust bearings. The result of this modification has dropped the pump thrust bearing temperatures 20-30 degrees on the two pumps, which have external lubrication systems. Bearing failures are expected to be drastically reduced with the cooler operating temperatures.

P-121C, the only motor-driven HVGO pump, had an additional problem in that it was continuously tripping off due to high amperage. ERAT's investigation revealed a simple culprit – an undersized motor. A more powerful motor was installed, and the nuisance trips were eliminated.

Another success was with a pump that was taken and left out of service for an extended period of time because it was believed to not be working. ERAT tested the pump, confirmed that nothing was actually wrong with it, and put it back into service. It's still running today.

ERAT meets on a weekly basis, adding more equipment to its hit list – and continuing to improve the performance and reliability of the Port Arthur plant.