TMG News
The Manufacturing Game®
April 16, 2007

"Sharing Information to Improve Reliability"

Confidence—The Magical Element of Cross Functional Teams

by Winston P. Ledet

In the thirteen years we have offered The Manufacturing Game® to over 32,000 participants, I have always marveled at the accomplishments of small cross functional teams and wondered what determines the great results they achieve. I have often sat with teams as they attempted to come up with a plan to eliminate a defect they identified as their target. From the rational point of view of an engineer, it appears that they will never arrive at a solution. Then someone comes up with an insight that immediately resolves the problem; the plan to eliminate that defect is then completed via some simple action or actions. Where did that come from? This is the phenomenon that we recognize as the magic in cross functional teams. But how does it come about?

An example, from a DuPont Chemical site was a team working on extending pump life in an ethylene plant. As it turned out, the biggest offenders were brand new pumps installed in benzene service. The pumps were totally enclosed without seals to avoid any leakage of benzene to the atmosphere. Consequently, the bearings in the pump were exposed to the benzene flow. Since benzene is a great solvent, it quickly washed all of the lubricant out of the bearings, causing them to fail. The team was stuck with a dilemma. If they used the seal less pumps, the bearings failed. If they used a pump with seals, some toxic benzene escaped into the air. This was the proverbial "between a rock and a hard place." After about 30 minutes of discussing alternatives, an operator said "Wait a minute; I think there is enough upstream pressure to move the benzene through this unit without a pump." Removing and

Five Sequential Rules for Creative Thinking

1. Seek information.
2. Ask: What do I understand personally and directly?
3. Ask: Am I going to take this problem seriously or not?
4. Have confidence that something can be done and there is a way through.
5. Understand that emptiness is necessary to allow arising of a spontaneous element that is outside of our own control. (Vacuity of the mind but clarity of the goal)

Summarized from *"Creative Thinking"* by J. G. Bennett, Bennett Books 1964

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The Essence of High Performance is Meaningful Work

Victor Frankl wrote in his book *"The Will to Meaning"*...

> "What I call the will to meaning could be defined as the basic striving of man to find and fulfill meaning and purpose."
>
> "It is one of the immediate data of life experience that man is pushed by drives but pulled by meaning, and this implies that it is always up to him to decide whether or not he wishes to fulfill the latter (meaning). Thus, meaning fulfillment always implies decision-making."

Empowering the workforce means "let them make decisions" so their work is more meaningful.

The managers' dilemma is how to let others make decisions without taking all the of meaning out of the manager's work. The general answer to the manager's dilemma is for the manager to do higher level work.

Application to a Manufacturing Organization

It is obvious that the purpose of any manufacturing organization is to produce products. Meaningful work in such an organization must add value to producing those products.

We have found that the limitations on the value of the products produced by a manufacturing organization are created by the

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What's Inside?

SCHEDULE

The Manufacturing Game® holds workshops for the general public at universities and/or various professional organizations across the country. For information go to www.mfg-game.com

Conferences of Interest

NPRA

NPRA Maintenance Conference

May 22–25, 2007
Houston, TX

To register or for more information please visit:
www.npra.org/meetings/maintenance

SMRP 16th Annual Conference

October 7–10, 2007
Louisville, KY

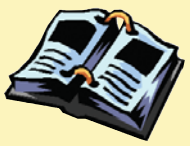
To register or for more information please visit: www.smrp.org

MaRS Symposium
Houston Chapter of SMRP

September 26, 2007
Houston, TX

For more information contact
EdFoster@mundycos.com

Mark Your Calendars!



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disposing of the brand new pumps solved the problem.

Another example of the "magical" accomplishments of cross functional teams comes from what was a well known problem at the former BP refinery in Lima, Ohio. The butane sphere was overheating in the summer months, and periodically butane had to be vented to the flare to relieve the pressure. This problem was already on a list of projects to be addressed by engineering with the approximate cost of $400,000. At a Manufacturing Game workshop, a cross functional team composed of people from operations and maintenance decided to work on this problem. They felt that the overheating compressor was a safety hazard in the summer months. Once the team started working on this defect they quickly determined that the cooler on the compressor was undersized; it was very hot to the touch. They recruited an engineer to be on the team to check the specifications on a substitute cooler. They had it refurbished and sent it on to engineering to ensure it passed through their management of change process for safety. The new cooler was installed and immediately the pressure on the vessel came down and the valve to the flare could be closed. The total cost for this improvement was $5,000. The team eliminated the safety issue and in the process cut out over $1.5 million worth of butane going to the flare annually. They also eliminated the need for engineering to address this problem for $400,000.

There are many examples where spontaneous ideas occur that cannot be explained in the cause and effect world of engineers. Over the years we have tried various methods to make the Action Team process more rational, but our efforts have not been as effective as we had hoped. To facilitate forming Action Teams, we developed a booklet that we believed would put order to the process, but over time we decided that it really didn't seem to be helpful. Our facilitators, as well as some of the engineers at our client sites, liked the booklet. We had to admit to ourselves, however, that even though it made the process more organized, it didn't seem to help with the quality of the teams or the results that they achieved. The best criteria for predicting success of Action Teams is still determined by how much the people on the team care about a piece of equipment that needs improvement and how well all of the functions are represented on the team.

I recently ran across an explanation by John Bennett that makes sense to me. John Bennett wrote books on the role of human beings in the universe. His view is that creativity is a gift that human beings receive when conditions are right. My understanding of these conditions involves four aspects. First, people have to possess certain skills and knowledge to help them recognize the details of the situation. Second, people have to have enough discipline in their work habits so they are not introducing extraneous variations into the situation. Third, people need a framework that helps them recognize the essence of the situation. Finally, people need to have the confidence that they have the first three aspects fully covered. It is this confidence that I think is the magic of cross functional teams. Bennett says, "Confidence is the element that creates the opportunity for something creative to happen spontaneously." My father-in-law, who was a successful businessman, always said he liked the "confidence" aspect of doing business. As an engineer, I always struggled to understand what he meant by "confidence" but now I think Bennett's explanation gives me a better understanding of the concept.

So how does confidence get created in a cross functional team? To paraphrase J.G. Bennett from a book he wrote in 1964, creative thinking

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happens when people are sure they have exhausted all the possibilities. Only then, do they come to have the answer. By having a cross functional team of people, who have intimate contact with the equipment in question; involved in a discussion about a problem they care about, it usually doesn't take very long to exhaust all the possibilities for a solution, or in fact, find a solution within existing knowledge. When the team thinks it cannot find an existing solution, and they think all possibilities have been exhausted, the magic can happen. When people start to think "outside the box" and new innovative ideas start to flow "The Confidence of Cross Functional Thinking" begins to happen.

Michelle Ledet with Rocky Bleier and his four Super Bowl rings.

SMRP Conference—2007

"Ordinary people can become extraordinary achievers," says Rocky Bleier, four time Super Bowl Champion. He was the motivational speaker at the 2006 SMRP Conference in Birmingham, Alabama where some of us from The Manufacturing Game® were privileged to speak with him.

He tells a story about how Terry Bradshaw was the first quarterback in the NFL to call all his own plays and how very proud he was of that fact. However, at the last play of one of the biggest games of his life he could not think of what play to call. He asked the players in the huddle "What play should we use?". They were dumbfounded - no one had ever asked their opinion before. They came up with some ideas and chose one that won them the play-off game.

It just goes to show you that when you involve people from every aspect of the industry and have them work together to solve a problem there is no problem too large or too small to conquer.

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imperfections in the equipment, policies, processes, and practices of the organization. Therefore, meaningful work in a manufacturing organization is the elimination of imperfections.

According to John Bennett, there are three kinds of imperfections that relate to three different levels of work. These are defects, excesses, and recycles.

One way to deal with the managers' dilemma is to delegate decisions on how to eliminate defects to the workers and have managers concentrate on how to eliminate excesses and recycles. In general this higher level work of managers is to create proper boundaries to avoid excesses in the elimination of defects and avoid recycles to old problems by institutionalizing the systems, processes, and structures that sustain the elimination of defects.

How can we get an organization to commit to the new work?

Albert Low says that commitment comes from identity. Therefore, if an organization is going to commit to empowering the workforce, a change of identity is required.

In our studies of manufacturing organizations, we have observed three different modes of functional behavior that create performance in three different Stable Domains that we call Reactive Domain, Planned Domain, and Precision Domain. We think that these three domains correspond to three different identities or selves that Bennett calls reactional self, divided self, and true self.

While these terms normally apply to an individual, we think they could also be applied to an organization. A fair application of these selves to an organization might be that a reactional self organization deals only with defects after they create functional failures. The divided self organization deals with defects before they cause functional failures and attempts to avoid future failures by removing some of the excesses that create defects. The true self organization, in addition to dealing with defects and excesses as the divided self does, adjusts the structure of the work to match the needs of the machines relative to producing the right product. This after all is the true purpose of the organization.

How does the change take place?

In order to achieve functional performance at the level of the Precision Domain, a transformation in identity from the reactional self to the true self has to occur. Our experience with two such transformations supports the framework of Kurt Lewin that says that the transformation takes place in three stages. First, the organization has to be unfrozen so that it can change. Second, the change must take place and third, the organization must be refrozen in the new structure. So contrary to many people's opinion, continuous improvement is not continuous change.

Applying Lewin's model of change suggests that managers have to create a safe place to let go of the reactional self in themselves so they can transfer that work to the workers. A good way to accomplish this is to generate a good set of standards which articulates the boundaries of acceptable imperfections. It is a generally accepted axiom that anything that creates value involves risk. Someone has to decide how much risk is excessive. This is the higher level work that managers should do. Clear boundaries are necessary to create the freedom within the organization for the workers to grow as decision makers. This freedom should

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When a team outgrows individual performance and learns team confidence, excellence becomes a reality.

— Joe Paterno

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be absolute for the present and past performance so boundary changes should only apply to future performance. Managers should be preoccupied with "how can we avoid this problem in the future?" This would be the elimination of recycles work. The managers must accept the risks associated with poor boundaries and not pass those risks on to the workers. The workers must accept the risks associated with the decisions within the boundaries and not pass the buck up to their managers.

Another requirement is to create the ability in the workers to make good decisions about defect elimination. What we learned from the System Dynamics model of a manufacturing facility is that defects come from all functions so the most effective means for addressing the systemic nature of defect generation, which is distributed throughout the entire organization, is to work in small cross functional teams.

Another aspect that has to be addressed is the fact that the region between Stable Domains is unstable. Some means of maintaining order while this change of identity takes place is essential. The means for keeping order is the management system. Therefore, it is imperative that the existing management system stays in place until the workers have proven they can make the decisions on defect elimination. A second process, which we call Leadership, must be created to make sure the change takes place. The change process then becomes a balancing act between management and leadership. This balancing act is a good way for managers to learn how to become a divided self, which we think is essential for middle managers who have to be able to attend to the needs of the workers on the one hand and the executives or shareholders on the other. The final stage of change requires the managers to take a longer time view and a broader perspective across their industry to learn the essentials that have to exist in the structure of the work to really serve the purpose of the organization in today's society. These essentials have to be embedded in the structure of the work in order to avoid the recycles to earlier problems that are often created by the growth of the business, technology, or needs of society. The organization that is successful at embedding these essentials into the work itself will create a true self relative to the purpose of manufacturing by creating meaningful work for everyone in the organization. This creates a place where the reward for doing good work is the joy of getting to do it again even better than the last time. Bennett says that we only know meaning through repetition. So getting to do the job better next time is essential to continuous improvement, which is the source of meaning.