



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

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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 manager's dilemma is how to let others make decisions without taking all of the 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.

The limitations on the value of the products produced by a manufacturing organization are created by the 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 manager's 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

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## **SCHEDULE**

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**The Manufacturing Game®** holds  
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For more information visit

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### **Conferences of Interest**



#### **Reliability & Maintenance Conference**

San Antonio, TX

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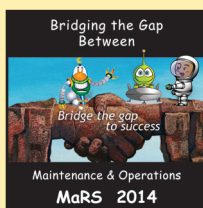


#### **System Dynamics Conference** Delft, Netherlands

July 20–24, 2014

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<http://conference.systemdynamics.org/>



#### **Houston Chapter of SMRP Maintenance and Reliability Symposium**

Moody Gardens Galveston, TX  
August 14–15, 2014

Golf Tournament August 13, 2014

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**Mark Your  
Calendar!**



### **The Essence...continued from page 1**

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 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.



# Relevancy Never Gets Old

*The Manufacturing Game® ran its first workshop in February of 1993. To celebrate over 20 years of business we are reprinting some of our Action Team stories from the past that are still appropriate today.*

“The reason for retelling stories is they are full of wisdom,” was once said by psychologist Gary Klein. Just like looking at old photographs, looking through old TMG newsletters brought back many memories. Many old Action Team stories are still relevant today. Defects in pumps, seals, valves, etc...they are never ending.

**TMG News December 1997**

## **The Centrifuge Team—A**

### **Proactive Maintenance Story**

Eli Lilly's Lafayette facility was having significant problems with their centrifuge equipment, which processes liquid streams in purification. There were an average of two belt failures and one seal failure every week, along with vibration levels on some of the machines exceeding two inches/second. These failures were costing 8 to 10 hours a week in down time and \$83,000 a year in maintenance expense. The action team assembled to work on these issues had representatives from operations, maintenance and engineering. The team conducted a root cause failure analysis and determined that the real villains were a lack of proper cleaning and a number of issues directly related to the condition of the equipment, such as poor shaft to rotor alignment, out of tolerance bearing fit, poor condition of o-ring seating surfaces and unmatched belt sets. To really eliminate these defects (in operator technique and equipment failure) every person on the team needed to contribute from their area of expertise as well as calling in experts from outside the company. The countermeasures that the team recommended and instituted were:

1. Improve cleaning. They obtained a high pressure system so the centrifuges could really be cleaned and worked on during the CIP procedure.

2. Refurbish centrifuges. They refurbished the centrifuges and brought them into spec on all the tolerances. They obtained a quote of \$55,000 from the manufacturer for refurbishing each pod. By working with a local machine shop, they were able to negotiate a price of \$20,000 and a delivery time that was two months less than offered by the manufacturer. They saved a total of \$150,000 on the cost of the rebuilds.

3. Install test stand. They installed a test stand to balance the centrifuges when they returned from rebuilding and/or when troubleshooting was needed. A procedure for alignment and routine vibration analysis was also developed.

The results have been TREMENDOUS! The belt failures now occur less than once every three months, rather than twice a week. The seal failures now occur less than once a month rather than once a week.

Vibration levels have been reduced tenfold or more. The benefits to the business are equally impressive. The maintenance expenses have been reduced by \$150,000 a year because of the reduction in repairs. The additional up-time has added production throughput and \$5,000,000 to the bottom line for the company.

Get the right people in the room and look out! The centrifuge team proves once again that Lilly people can pull together and really accomplish great things. **T**ogether **E**veryone **A**ccomplishes **M**ore is their slogan and proactive maintenance's goal is to accomplish more with the people and equipment they have on site.



**Together Everyone Accomplishes More**

**TMG News June 1998**

## **Taking Ownership**

Changing mindsets and behaviors is often the most critical element to improving reliability, but it is also one of the hardest to do. One of our clients related a story to us that shows the power of developing people's understanding and commitment to reliability. This client's product is produced through a series of molding, machining and assembly processes.

At the end of the shift, the day after a Manufacturing Game Workshop, an operator discovered that the machining of parts in his area was not being done correctly. The part was locating incorrectly in the machining center. He brought the problem to maintenance and suggested that they grind the locating pin on the palette to insure alignment. The technician immediately recognized that grinding the pin would only lead to more defects since the pin was there to hold the part in a specific way. Changing it would lead to poor alignment along some other dimension. Besides, this machining operation had four other palettes with locating pins at the exact same position that did not cause any problems.

The technician found that a design change had been made to the machining equipment that required all of the clamps that hold the parts on the palette to be ground. The defect came when this change was not documented or carried through to the spares for this equipment. When the clamp was changed on one of the palettes it had not been ground to the new specification and no one knew to modify it. It would have been easy for the technician to stop there, grind the clamp to the new specification and consider the problem solved. He recognized

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## TMG News

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that the defect was not just in the part but in the poor follow through on the design change. He was determined to eliminate this defect.

#### TMG News March 1998

#### Booster Pump Running in Error

Many Action Teams launched from The Manufacturing Game workshops will tackle the "low hanging fruit" first. Here is a perfect example.

A team member responsible for training at a chemical company questioned why one of their booster pumps was always running. Their building has a booster pump on one of the cooling water systems that is suppose to cut in when the pressure drops below a certain point. At some point the pump had been put on manual and left running. This had gone on for so long it became the normal practice. Investigation into the system requirements showed that continuous running was



not required, so it was shut down. This saved \$10,000/year in energy costs as well as reducing the amount of maintenance that would have to be performed on the pump.

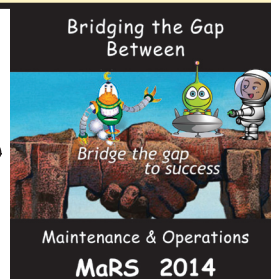
Some of these stories are still useful today. If there are any ideas for defect elimination you found amongst these stories feel free to use

them. Or maybe they spurred you on to eliminate a few of your very own. There are many more stories out there. If you have a defect elimination story you'd like to share or have a question as to how to start your own cross-functional defect eliminating action teams contact us at [info@mfg-game.com](mailto:info@mfg-game.com).

The Houston Chapter of SMRP announces the 8th annual Maintenance & Reliability Symposium, August 14–15, 2014 with a preconference golf tournament on August 13, 2014 at Moody Gardens—Galveston, TX.

Keynote speaker for this year's Symposium is Ron Moore. Ron is the Managing Partner of The RM Group, Inc. and consults with manufacturing and industrial companies world-wide. He is also the author of fifty journal articles and several books including *What Tool? When?* and *Making Common Sense Common Practice*.

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