



←—————|—————→  
 "Sharing Information to Improve Reliability"  
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## Action Team Solves Mystery

The performance of the 7FC6 control valve on VPS1, at Motiva - Convent, had been determined to be inadequate after four failure events within several months. The malfunctioning of the valve positioner made it difficult to maintain product specs resulting in product quality problems and frequent callouts to operations and maintenance personnel. Action Team members William Christopher (Instrument Engineer), Sarah Christian (Process Engineer), Tony Nathan (Operator) and Shelby Hebert (Maintenance) met in the control room in order to see the problem first hand. Upon arrival, the control board operator informed the group that E & I had just changed out the positioner on the valve... problem solved. The team thought that this might end their investigation of the issue, but decided to follow up with operations and make a field visit.

The valve was located on a hot oil line (approximately 620°F) that the team noticed was only partially insulated. Past the by-pass valve, there was no insulation. A temperature gun was used to determine that the actuator temperature was 155°F and the digital positioner temperature was 175°F. While the positioner was rated to 185°F, it was not designed to operate at that temperature for an extended period of time. According to vendor literature, the continuous upper end operating temperature for the digital positioner is 140°F. Consistent exposure to the radiant heat from the uninsulated piping would cause the new positioner to fail prematurely, so the replacement of the digital positioner during the week of July 31<sup>st</sup> would only be a temporary solution if the source of the defect, the exposure to the excessive heat, was not

# How High, How Far, and How Fast? Assessing Your Organization

What improvements is your organization pursuing? It is likely that your management has spent a lot of time reviewing best practices and evaluating which ones can provide the needed performance improvements. But has any effort been expended to determine which of these best practices are "doable" within your organization? Putting best practices into place is substantially more difficult than just talking about them. The reason for this can be tracked back to the readiness of the organization to change into a high performing entity. While many individuals within the organization may be ready to make the change, it will not be sustained and may not even happen at all without the organizational unit being ready for the change.

In an article written by MIT System Dynamics Professor John Sterman and Nelson Repenning, published in the California Management Review in 2001 ("Nobody Ever Gets Credit for Fixing Problems that Never Happened"), the authors discuss the impact that the structure of a system has on the behaviors within that system. The actions of individuals within a system cannot overcome the fundamental nature of that system. As stated by Sterman and Repenning:

*The attribution of a problem to the characteristics—and character flaws—of individuals in a system rather than to the system in which they find themselves is so pervasive that psychologists call it the "fundamental attribution error".*

### How do you assess your organization's readiness for change?

In the early 1990's, a System Dynamics computer model was created to make sense of extensive benchmark data that had been gathered by DuPont. While providing key insights for the group who developed the model, it was a completely ineffective tool for sharing those

insights with others in the organization. The desire to share these insights widely across the organization led to the development of the first and second versions of The Manufacturing Game<sup>®</sup>. Over the last twelve years, as a result of the broad experience gained working in a variety of industries, we have made significant enhancements to the original model. By capturing the lessons from these experiences, we have made both the model and the workshop more robust. The model has recently been modified so that it can be used to help companies determine their readiness to

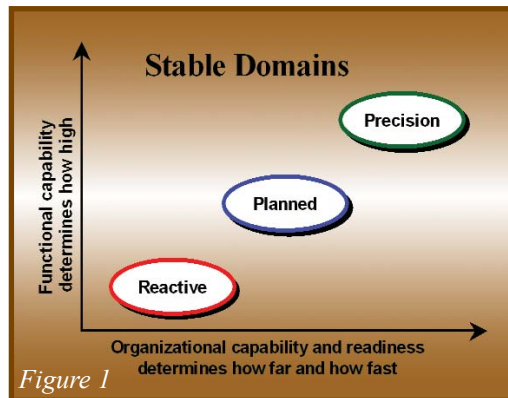


Figure 1

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**What's Inside?**

How High, How Far, and How Fast?  
Action Team Solves Mystery

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Calendar

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# SCHEDULE

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

## TMG Public Workshops

**SMRP 14<sup>th</sup> Annual Conference**  
**October 25, 2006**  
**Sheraton Birmingham**  
**Birmingham, Alabama**



To register or for more information please visit:  
[www.smrp.org](http://www.smrp.org)

## Conferences of Interest

**SMRP 14<sup>th</sup> Annual Conference**  
**October 22–25, 2006**  
**Sheraton Birmingham**  
**Birmingham, Alabama**



To register or for more information please visit: [www.smrp.org](http://www.smrp.org)

**IMC 21<sup>st</sup> Annual International Maintenance Conference (IMC) "Manufacturing & Process Reliability"**

**December 5–8, 2006**  
**Daytona Beach, FL**

To register or for more information please visit:

[www.MaintenanceConference.com](http://www.MaintenanceConference.com)  
 or call 888-575-1245



**The Reliability Centered Maintenance Managers Forum & Enterprise Asset Management Forum**

**April 3–6, 2007**  
**Honolulu, Hawaii**

To register or for more information please visit:

[www.MaintenanceConference.com](http://www.MaintenanceConference.com)

**Mark Your Calendars!**



**Action Team...continued from page 1**  
 addressed quickly.

Based on their experience in The Manufacturing Game® workshop at the end of July, the team knew that they must address the source of the defect in order to achieve a lasting improvement in performance. They consulted with Vince Reulet (Maintenance) and determined that a quick and easy way to address the source of the defect was to write a ticket to have the pipe



*Uninsulated piping near control valve*

insulated. The insulation work was completed the week of August 17<sup>th</sup>. Following the repair, the temperature gun was again used to determine the temperature of the positioner. It was now an acceptable 130°F. After speaking with other board operators, Tony Nathan confirmed that since working on this project to eliminate the bug, "We have not had another problem with that valve on the GOU" and all of the board operators agreed that it was wonderful to get 7FC-6 repaired correctly.

During the investigation process, the team learned that when operators have a problem with a control valve, they might block it in and run on the bypass valve until maintenance gets there to work on the valve. This is exactly what had occurred when the 7FC6 control valve had started to malfunction. Because the operators had been running on the bypass valve, the control valve had cooled down prior to the arrival of the E & I technicians to install the new digital positioner. Since the E & I technicians did not see the process in



*After installation of piping complete.*

operation, they were unaware of the excessive heat that was causing damage to the positioner during normal operations. The Action Team members were able to quickly identify the source of the problem only because they were in the field when the operation was in its normal lineup. A cross functional approach, combining the knowledge of the operators with regard to normal operating conditions and the knowledge of the mechanics who were aware of the damage that excessive heat could do to the valve, was necessary in order to treat the cause of the defect and eliminate it instead of just tackling a symptom. The resolution of this chronic problem will save operator time since they will be able to control this flow automatically instead of having to do it manually with the bypass valve. And it will also make it easier for operations to keep the process running on-specification.

The Action Team members also took the opportunity to speak with several of the operators in the area and share with them what they had learned about the problems that heat could cause with positioners and other instruments. It is likely that similar problems exist throughout the plant and could be as easily solved, as this one was, if engineering, operations and maintenance

personnel are all aware of the potential problem. The team recognized that there is a learning that needs to occur so that people recognize that missing insulation *can* be a serious problem. When additional instances of missing insulation are found, the operators have the ability to use their heat guns, one of

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**How High...continued from page 1**  
 change. An assessment can help a company determine which Stable Domain is achievable by their organization. While most people would like to achieve the Precision Domain or consider themselves to be pushing toward World Class, they might discover that their organization is only ready to go to the Planned Domain and that they will need to have other initiatives and change the mind set of their people to achieve higher domains.

**Find key leverage points through an assessment.**

There are various key leverage points within the best practices that are unique for each organization. Examining data from a specific site such as performance differences in practices, existing management policies and change initiatives effecting the site will help to identify those key leverage points. This examination can provide insights about where to find the best opportunities to gain leverage for lasting change. Although there are many leverage points, the key is in deciding which can have the highest value for a given organization with their current state. By making this determination up front, the trial and

**Action Team...continued from page 2**

their RCM tools, to check the temperature of instruments that might be impacted by the radiant heat. The team believes that with everyone's help, missing insulation can be identified and corrected, preventing many instrument failures. This will free up significant amounts of E & I time, allowing them to concentrate on higher priority, more value adding activities.

Congratulations to this tenacious team! They did not stop until they were certain that the source of the defect in the control valve was completely eliminated. Their story is a great example of the effectiveness of using cross-functional teams to identify and eliminate defects, contributing significantly to improving overall refinery performance. There will be more success stories to come, so stay tuned. ♦



error approach to change can be avoided.

A good assessment predicts the impact that the various practices and strategies will have on the level of performance of your organization. It will provide information needed to determine not only what level of performance your organization can achieve, but also, how far and how fast your organization can accomplish that change. A good assessment will clearly and concretely identify your site's high leverage points and also predict which Stable Domain is achievable by your organization. The insights gained from an assessment will provide the information necessary to develop a very concrete plan of action that takes advantage of high leverage points and eliminates low leverage activities.

The level of ownership felt by employees is a key factor in achieving the performance of the best practice companies. Our definition of ownership is "people's willingness to initiate and participate in proactive improvements". All of the technical tools to increase reliability alone do not help the reliability 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, reliability will decrease. Preventive Maintenance and Predictive Maintenance are great tools, but these and other Best Practices assume that work systems are uniform and under control, as pointed out by W. Edwards Deming. We have found that a systems approach to defect elimination creates that type of control in the minds of the employees. The use of cross-functional teams seems to create the total systems perspective needed. Ownership involves three elements: responsibility, authority, and accountability. Defect elimination Action Teams are a great way to instill this important factor into an organization.

Other important factors, "company culture" and "culture change", have

become tainted words in today's vocabulary. Often because the terms have been used to force change that did not have any apparent business focus. A definition of "culture" found in the dictionary is: Culture is the intangible set of beliefs, behaviors, and assumptions that guide people's day-to-day activities. With this definition in mind, it is easy to understand that if the level of employee ownership is low, the day-to-day activities of these employees can be unfocused, uninspired and non-productive.

**Use metrics to monitor progress**

As a company begins implementing the identified key leverage points to improve organizational performance, it is just as important to consider the metrics that will be used to gauge progress. Without some measurable framework to note the improvements being made, it would be easy to lose heart, and let the improvement effort die. We have found that the framework of Goals, Means and Consequences is valuable in evaluating the use of metrics to monitor progress in achieving the sought after best practices along with a higher domain. In general,

organizations get confused about which metric to drive. As your journey in the improvement effort is undertaken, it is important that the metrics used change as you begin to make progress. In the beginning of an improvement process, it is important to clearly state the goals. People must see these goals and understand them in order

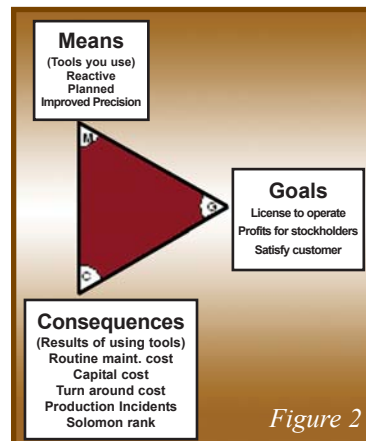


Figure 2

to also see the value of the means and create the right expectation for the consequence variables.

Figure 2 depicts the relationship of the three categories. In the Precision Domain, the level of attention to detail can only be motivated by service to a noble goal. The means metric is used to adjust the process to achieve the goals. These metrics also need to change as the organization approaches different domains. For example, a priority system is very important in the



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**“Motivation is everything.**

You can do the work of two people, but you can't be two people. Instead, you have to inspire the next guy down the line and get him to inspire his people.”

—Lee Iacocca



**TMG News**

**How High.. continued from page 3**  
 Reactive Domain because the failures are random, and it is important to choose the best leverage jobs to work on when the work peaks. It also provides a way to keep track of the backlog of things that need to be done when the workload wanes. Some idea of the goal measurement for reactive maintenance, such as uptime of equipment, helps focus the effort, as long as you are in the Reactive or Planned Domain as an organization. A better metric for evaluating the Precision Domain is the number of work orders, because that correlates with the number of defects being generated. Another important factor is the form of the metrics. It is better to measure the rate of the work instead of the static portion such as the stock of backlog. The improvement will be detected in the trend of a flow much faster than the change in the backlog.

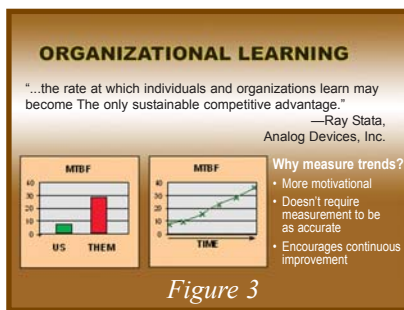


Figure 3

The backlog integrates the history of the flow but not the trend. Backlogs are useful in determining the need for more resources but do not depict the dynamics of the organization. An organization that is the poorest in its industry can be at the top in a couple of years if they get on a 10% learning curve.

In summary, it is important to keep in mind the value of assessing your organization to discover the high leverage point best practices. Understand that the system or organization is the focus of the change. You must establish a set of metrics understood by the employees to determine the progress that is being made. With these elements in mind, your site is in a position to move to a higher domain, and in the process, become the organization it is capable of being.

Participate in a **Manufacturing Game Workshop** being held at the RCM/EAM Management Forum in **Honolulu, Hawaii!**  
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