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## BP Solar Shows How Fast an Organization Can Change

## Getting To Stage Three

by Winston P. Ledet

As many of you know, the change in an organization to proactive manufacturing is a Hero Journey that takes place in three stages. In the First Stage, something must be done to unfreeze the organization so that the change can take place. In the Second Stage, the work of changing the organization is the main focus and many of the activities are aimed at the specific targets of change. In the Third Stage, the organization must be refrozen into its new form. We have recently presented a paper at the System Dynamics Society conference (<http://www.systemdynamics.org/conf2005/indexpapers.htm>), which covered four case studies of manufacturing organizations we have worked with.

In two of the cases, the organizational change was sustainable for up to 10 years and in the other two cases it was not sustainable. We are currently endeavoring to create a computer model, to help us better understand why some changes are sustainable and some are not.

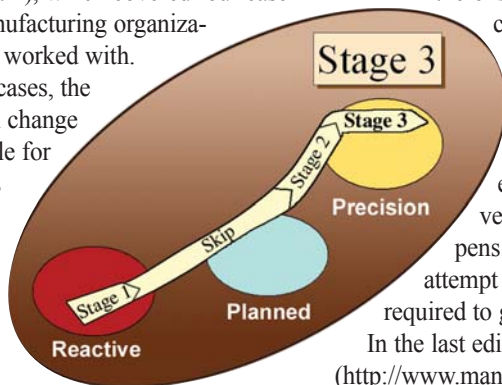
At this point in the study, it is becoming evident that several factors seem to be important. First of all, the evidence is getting stronger and stronger that the Planned Domain is not very stable and a continuous effort is required to maintain an organization in that domain. My 27 years of experience at DuPont included seven rather successful attempts to achieve the Planned Domain but all of those efforts have failed to be sustainable in the long run. I've concluded that organizations that set the Planned Domain as the ultimate goal will

not be able to sustain the improvement long term. A second factor is the ability of the organization to provide a leadership process that expands the freedom of the workers to improve the performance of their facilities by setting some clear new boundaries for the new freedom. Many managers don't have the courage to allow workers the freedom while others give the freedom without clear boundaries, which is equally detrimental. If, however an organization does set a goal to attain the Precision Domain and can provide the proper leadership to create the freedom for the workers,

there is yet another hurdle to creating sustainable change.

The refreezing of an organization in Stage Three requires something extra that is somewhat elusive to explain but is very clear to see when it happens. In this article, I will attempt to give our view of what is required to get into this last stage.

In the last edition of our newsletter, (<http://www.manufacturinggame.com/docs/July2005Newsletter.pdf>), we published a view of Rewards and Recognition that varied according to the domain of performance. In the Reactive Domain, getting the equipment operational after a failure and the overtime associated with that work is reward enough for the workers. In the Planned Domain, it is necessary to have some sort of monetary reward to keep the workers motivated to continue doing the planning which avoids failures but leaves no evidence that a failure would have occurred. In the Precision Domain, the reward comes from the work itself. The reward in the Precision Domain is the satis-



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In February 2005, Paul Monus, Global Quality Manager for BP Solar, visited BP Solar's San Sebastian de los Reyes plant in Madrid, Spain. During his tour with Marta Tojeiro (Plant Engineer) and Encarna Bonita (one of the union leaders), Paul was amazed at what he saw. The facility was buzzing with activity and things were running "like a Swiss watch". Morale was visibly strong and employees were having fun while working hard. Supervisors were very friendly, engaged, and visibly participating with the front line throughout the day. None of these things had been evident a year ago. Something powerful had happened at the plant in the last year, and the proof was in the numbers. Yield had improved by 4% and there was no longer unreliability in key equipment, such as the stringer.

While meeting with some of the employees, Paul thanked them and commented that all of their hard work had really made a difference. They all nodded in agreement and one person stated "It is because we are still killing the Bichos!" as she pulled a "TMG No Bug" poker chip out of her pocket and held it up for all to see. Everyone laughed and agreed. This poker chip had been given out at the conclusion of Manufacturing Game® training a year prior. It was for participants to keep as a memory jogger; encouraging them to keep pursuing defect elimination. The fact that the workers remembered the game and even carried TMG souvenir chips in their pockets indicated that something powerful and lasting had been created. The module line at San Sebastian had just undergone a "paradigm shift" that affected manufacturing processes and throughput in major ways.

Paul's thoughts flashed back to just a year ago, to late 2003. Problems that the plant had previously been unable to fix lead to module quality problems that had culminated in a crisis. Commitment to quality standards led to a 75% drop in production rates, pressurizing costs, and

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faction of properly caring for equipment so it performs at its peak, making everyone's job easier. I based this view of Rewards and Recognition on three modes of behavior that I observe in myself and in others. I find myself reacting to failures in the equipment or other assets for which I feel responsible. I create plans to avoid past failures based on my predictions for failures in the future, and I sometimes develop routines to avoid creating the defects that are the root causes of the malfunctioning of our equipment or other assets. It now appears that the only stable forms of these behaviors are where employees react to failures in the Reactive Domain or work to eliminate defects in the Precision Domain. This is true because they both have a reliable feedback mechanism. In the Reactive mode, the failure is a clear signal that action is needed if the production of products is to continue. The Precision Domain is much more subtle. The only way to detect the defects is to understand clearly the functions required of the machines and how these functions work. When you have a high level of understanding of your equipment and enough discretion in your job to take action, steps can be taken to avoid creating the defects that would destroy the

proper functioning of the equipment. Many organizations recognize this need and try to create the ability to avoid defects through training. I find that this is not enough. The Reliability Centered Maintenance (RCM) approach takes a much more rigorous technical approach by defining all of the functions and functional failure modes as a means to articulate the inspections and corrections needed to avoid creating the defects that would lead to failures. This method is much more thorough and the people who practice it well get sustainable change. However, this RCM approach does not address a critical element of the implementation of their analysis. That element is: "How do you develop the kinds of routines in workers' daily activities to implement those inspections and corrections?" Robert Fritz says in his book, The Path of Least Resistance, that in the long run, people take the path that is easiest to follow in their daily activities. Therefore, sustainability involves creating a way of doing work where the easiest way is the right way. I have looked at several ways to create a situation where the easiest way is the right way. One of our thoughts was to create systems where it is hard to do the job wrong and easy to do it right. In the DuPont benchmark we found a great example of a company that supported Planned Maintenance. They created a system that provided automatic budget approval for any job planned and scheduled at least one week in advance. If something broke, the system required approval from the plant manager to get it fixed. This created a path of least resistance to do planned work. This worked fine for more than 25 years until the person who made that rule retired. While this is pretty good sustainability, it required one individual to remain at that site and in charge for 25 years to get that result. Not many sites have that luxury today.

In looking at some of the other facilities where the improvements seem to be sustaining in spite of multiple changes in management, we are finding that the source of sustainability seems to be in the habits of the workers. There is no visible system or process that is creating the sustainability. The workers have evolved to the point where the right way of doing the job is also the easiest way to do it, because it is their habitual way of working. A great example of how this looks came to me when I asked a question about pump alignment at a site where Proactive Manufacturing was alive after 10 years with two changes of owner-

ship of the site, and three changes in plant management. I asked if the mechanics had accepted the best practice of laser alignment of pumps when they are repaired. The rotating equipment specialist laughed when I asked. He replied, "It is funny you asked that. Last week one of the mechanics said we would do a better job of aligning a particular compressor in cold weather by using dial indicators. He had a correct technical reason for this, so I said, "sure go ahead." His reply was, "Yes, but could you get us a class on how to do it, we have forgotten how." When we started the improvement process 10 years before, it was very hard to get people to use the laser alignment tools. This is the kind of change that has to happen to get to Stage 3.

To get the organization frozen in the Precision mode, you have to get to the point where everyone is doing his or her job in this precise way as a matter of habit. In whatever we do, the habitual way is the path of least resistance. One of the things we have noticed is that the people who are most helpful in Stage One, where we are trying to break the old bad habits, are not the best ones to create the new habits. Also, the people, who are the best at creating the changes in work and management practices in Stage 2 of the change, are not the best people to create the new habits either. Therefore, part of the art of creating sustainable change is to have a variety of people who take on the hero role in the part of the journey that they are best suited to lead. Creating this revolving leadership role is an important part of creating sustainable change.

We are now working to better understand how that leadership process works and would be interested in receiving input from people engaged in the journey. The process appears to be involved with the question of commitment and how commitment happens. There is something special about serving a purpose that appeals to most people. Could it be that organizations have to discover the prime purpose of the facilities they run in order to take ownership of that facility and tend to it in a way that best serves the primary purpose of having the equipment at that particular location at that particular time? Is that the source of pride that creates a truly great organization? Are heroes the ones who see the purpose in things and commit to serve that purpose no matter what sacrifice is necessary? Is serving a purpose the only way to experience meaning in your work?

#### Conferences of Interest



#### 13<sup>th</sup> Annual SMRP Conference St. Louis, MO

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To register or for more information visit:  
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**Mark Your Calendars!**

## Insights about rapid change at San Sebastian:

1. The customer crisis provided the business driver for change.
2. Catalyzing the workforce engagement and motivation was important.
3. Quality Task Force and LEAN engineering focus provided the needed context and leadership.
4. Sustainable step change results.

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headcount. At that time, front line workers at the plant had little ownership or awareness of their contributions to customer satisfaction and willingness to buy from BP. Customers were appreciative of BP's commitment to high quality standards, but they also wanted the agreed volume of modules, and the plant had been unable to supply these. Critical quality and production goals had to be met or a major European customer would abandon BP for a competitor.

In parallel with the quality and plant operating problems, a major restructuring process was underway, to make changes in operating effectiveness, and this had implications on people. Morale was at an all time low. The San Sebastian plant faced these major obstacles via a Quality Task Force, which was established to investigate and resolve the quality issues, before production could resume. The task force attacked key result areas via a dedicated leadership team. With Emilio Mera, Operations Excellence Director, as leader, three action plans were put in place, complimenting each other.

The first action plan was oriented towards giving front line workers a customer orientation. Regular



random quality assessment by customers were fed back and discussed at the plant, such that workers began to understand and support key customer requirements.

The second action plan involved a full redesign of the shop floor workflow with participative management and training of the work force including cross plant participation. David Walters, who was at that time working as a senior engineer of the plant, engaged workers and specialists to customize LEAN principles to San Sebastian's unique needs.

David and various other engineers, assisted Emilio via various engineering "work packages" to address key problems. Peer assists from sister plants in the USA and India led to some quality and operational breakthroughs.

The third action plan was

focused on creating a "dynamization" of the work force through the "game". Miguel Balbuena, Plant Manager, had been leading the restructuring effort, to improve productivity and effectiveness of the Madrid factories, but had found front-line support and buy-in for key goals to be insufficient. It was hoped that the Manufacturing Game® would "catalyze"

engagement and participation in task force goals, such that the business prize could be realized. It was within the context of these other parallel activities going on in the task force, that management had scheduled four Manufacturing Game® workshops during January 2004.

In spite of concerns about whether workers would receive the learning, because of worker dissatisfaction with some policy changes,

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Mihaly Csikszentmihalyi, in his book, Flow, says:

*"We have all experienced times when, instead of being buffeted by anonymous forces, we do feel in control of our actions, masters of our own fate. On the rare occasions that it happens, we feel a sense of exhilaration; a deep sense of enjoyment that is long cherished and that becomes a landmark in memory for what life should be like. This is what we mean by optimal experience. It is what the sailor holding a tight course feels when the wind whips through her hair; when the boat lunges through the waves like a colt - sails, hull, wind, and sea humming a harmony that vibrates in the sailor's veins. It is what a painter feels when the colors on the canvas begin to set up a magnetic tension with each other, and a new thing, a living form, takes shape in front of the astonished creator. Or it is the feeling a father has when his child for the first time responds to his smile. Such events do not occur only when the external conditions are favorable, however: people who*

*have survived concentration camps or who have lived through near-fatal physical dangers often recall that in the midst of their ordeal they experienced extraordinarily rich epiphanies in response to such simple events as hearing the song of a bird in the forest, completing a hard task, or sharing a crust of bread with a friend."*

If the experience of flow is the secret to getting into Stage 3 of the transformation of an organization, how should we pursue creating that state? The advice given by Viktor Frankl, in his book Man's Search for Meaning, is: "Don't aim at success - the more you aim at it and make it a target, the more you are going to miss it for success, like happiness, cannot be pursued; it must ensue ... as the unintended side-effect of one's personal dedication to a course greater than oneself." For me, this statement seems to catch the flavor of what I saw at the Lima refinery. People decided to do what they felt to be "right" in spite of the decision to shut down the refinery. This resulted in such excellent performance, that Clark

Refining decided to purchase the refinery 3 months before it was shut down. The people who worked there realized they had saved their refinery by pursuing what they knew in their hearts was right for the refinery. They truly own it, because it would not exist today if they had not saved it.

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Just e-mail Sherri at [sherrimabshire@aol.com](mailto:sherrimabshire@aol.com) to request an electronic copy of the Action Team Survey form and get to work...it's as easy as that!



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**Obstacles** are those  
 frightful things you see when  
 you take your eyes off your goal.  
 —Henry Ford



## TMG News

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management decided to go ahead with the workshops. Miguel Balbuena attended the workshop himself as a participant, and along with Costa Zis gave talks to workers about their vision and why the changes proposed were so necessary. Just as important, they spent time listening to what plant workers had to say.

In spite of a rough start, Manufacturing Game® workshops went very well. Workers were great participants and were very disciplined. Improving understanding of the business context and how the various functional activities fit together as a whole seemed to allow workers to engage and support the vision and goals of the company in a new way. 27 Action Teams were launched, with the hope of adding to Task Force engineering work packages. Dialogue between workers, engineers, and managers improved and momentum built.

The combined activities of the quality task force, in total, enabled the plant to resolve the key issues. San Sebastian delivered against goals successfully thus enabling BP Solar to retain their major customers. Production volume was adequate to meet orders, and the customers recognized product quality enhancement. Many LEAN

projects were implemented, such that the effectiveness of the factory dramatically improved. The goal of creating a better work atmosphere and real productivity gains of ca. 50% + also occurred. Even with ups and downs, rapid performance improvements continued, and San Sebastian was able to meet all critical requirements successfully, in the midst of the turbulent organizational climate. A major impact of the Manufacturing Game® workshops was to create the missing motivation in the front line to support the newly established Quality Task Force objectives.

Reflecting back on all of this a year later, the changes in the people appear to be sustainable—people are in a new paradigm, working as a team between operations and maintenance and the business, the ambience is calm and professional, and there is more opportunity for front line people to be leaders and contribute their ideas.

Today, it is difficult to even remember the crisis of a year ago. Problems are few, and production is not only back up to normal levels, but with better quality than ever. When Marta Tojeiro was asked how these astonishing results came about, she replied, "We worked together".

Due to their determination and hard

work, the Quality Task Force was successful in resolving the problems, and in doing so created a bright future for San Sebastian.

Dialogue about what happened and how it occurred revealed some new possibilities:

1. It may be possible to jump from Reactive Domain to Precision Domain in only a few months, instead of years. SSR's rapid performance gains, albeit in an industry with less complexity than refining or chemical plants, suggests that we should not be afraid of expecting fast performance results (months, not years).
2. People engagement is key, even in highly automated factories, with rapid technology change. People make the difference and we need to create the space and environment for front line teams to participate in leadership and build ownership of their own work processes.

With the major performance gains San Sebastian workers accomplished, their largest customer in Germany now wants to triple orders from 5 megawatts in 2004 to 15 megawatts in 2005. This growth would have been lost if San Sebastian had not found the way to drive rapid improvements in throughput, quality, yield, and customer and employee satisfaction.

Employees are enjoying their success.