TMG News
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"Sharing Information to Improve Reliability"

Restoring Operational Excellence at Andrew Platform

BP's Andrew platform leadership was facing a dilemma in early 2001: how could they regain their performance excellence and overcome the recent rash of problems and failures? Andrew's history was one of innovation and fantastic teamwork – without these, the Andrew platform simply would not have been built. Following the commissioning in 1996, the operations crews had to work very hard to iron out the plant teething problems and design bottlenecks to deliver the design operating efficiency of 85%. Many stories followed and Andrew became renowned for preaching about how good they were. However, in reality a lot of the inner self-belief had been lost when the asset moved from being an autonomous platform to being part of Greater Forties Unit (GFU). They felt that a lot of their ability to create their own future had been taken away. There was no dedicated support anymore for Andrew; the GFU Ops support was shared across 7 manned platforms and 2 unmanned platforms.

A tremendous amount had been achieved through Area Ownership in the first 3 years of Andrew Operations; however, this process had dwindled. There were still a few key players who were committed, but over 50% of the original technician team had moved on to other jobs and the new technicians had not been adequately introduced to the Area Ownership principles. In February 2001, it became clear that the achievements of Andrew were at risk. Operating efficiency was down to 58% when the target was 85%. Unexpected equipment failures and plant restrictions due to an unexpected influx of sand and scale had combined to make, in the words of operations engineer Mike Thomas, "a very bad time indeed for us." The sand and scale became a focus of their defect-elimination efforts. The Andrew crew had not been monitoring it because, "It's never been a problem here." Then suddenly, according to Brian McLeod, relief Offshore Installation Manager (OIM), "We woke up one morning and the place was full of sand."

The crew was constantly fighting metaphorical fires, having to react to problems cropping up. In Feb 2001 they planned and implemented two mini-TARs (1-2 day shutdowns) within 2 weeks to fix these issues. The costs of the mini-TARs in the first half of 2001 were estimated at £2m, which was the amount the operating budget was exceeded by in 2001. Safety performance was also at risk because they had to plan and implement major plant interventions in such short timeframes. This compromised the team's capability to assess all the risks in performing the repair work. One high-potential incident that occurred was when a contract cleaner entered a vessel to unblock the outlet, when the vessel had not been prepared properly for man entry. The platform management team had not taken enough time to recognize this possibility and ensure that this could not happen.

When David Lane started as Operations Manager for Andrew in late 2000, there was some recognition that the GFU organization was not adequately supporting Andrew's needs. He began setting up a dedicated team for Andrew in the first quarter of 2001. The OIMs justified the need to re-introduce the Offshore Operations Engineer (OOE) role, and modified the role of the OOE to focus on Operations Excellence coaching. David, recognizing the need to support Operations Excellence appointed Brian MacLeod as Andrew Ops Ex Team Leader.

The team had to get back to a place where

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The Power of Pervasive Root Cause Analysis

Root Cause Analysis has been around for a long time and yet only a small percent of failures are driven to their root cause. As part of our continuing examination of our Dynamic Benchmarking model, we have written about the highest leverage point - "ownership" by the front-line. Root cause detection and elimination is one of the most important potential products of high "ownership" if the organization is prepared to take advantage.

The typical facility will reserve root cause for big, expensive failures or for highly repetitive failures. The reasons behind this approach are clear. Only a few people in the organization are capable of conducting this analysis and are given the freedom to pursue the root causes. When this sort of investment is made, it must be focused on the biggest problems.

The impact of finding the root cause

As we have discussed before, there are 7 major sources of defects as shown in Figure 1 (page 4). Most of these defect sources will be familiar to the reader with the possible exception of Defect Progression. Defect Progression is simply the effect of a small defect turning into a large one over time. Today's loose nut, becomes tomorrow's misalignment and next week's failure. The five highlighted sources of defects in Figure 1 are self-reinforcing. This dynamic highlights the importance of root cause. If a symptomatic repair is completed without getting to the root cause then a latent defect is still in the system. Due to Defect Progression it will pop up again over time. Additionally, if the root cause is workmanship, operational discipline or parts quality the same failure may come back rapidly as "infant mortality." In the benchmarking model, a plant that is 50% reactive with moderate "ownership" and no root cause work going on will improve its overall profit by 18% over three

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Conference Calendar

See you at these conferences in 2003:

American Society for Training and Development (ASTD)
Annual ASTD Conference
18-22 May 2003, San Diego, CA
For further information call ASTD at (800) 628-2783 or visit their Web site at www.astd.org.

National Petrochemical & Refiners Association (NPRA)
Annual Conference
20-23 May 2003
Salt Lake City, UT
For further information, call NPRA at (202) 457-0480, or visit their Web site at www.npra.org

Productivity Inc.
Annual TPM & Lean Conference
27-31 October 2003
Nashville, TN
For further information call Productivity Inc at (800) 394-6868 or visit their website at www.productivityinc.com.

Society for Maintenance & Reliability Professionals (SMRP)
Annual SMRP Conference
2-5 November 2003
Indianapolis, IN
For further information call SMRP at (800) 950-7354 or visit their website at www.smrp.org.

Throughout the year, The Manufacturing Game® holds workshops for the general public at various universities and/or professional organizations across the country. Please check our Web site at *www.manufacturinggame.com* for registration details and frequent updates. Please check the Project Value Game® Web site at *www.practicefields.com/pvg.html* for information and updates on Project Value Game workshops.

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they truly believed that they could influence their own destiny again, and move away from the "we are victims" mentality that had come with the move to GFU. In February 2001, The Operations Excellence Game (OEG), an upstream version of The Manufacturing Game®, was initiated. With its burgeoning issues, Andrew was viewed as a prime opportunity to reap the benefits of Action Teams in eliminating defects. One of the key drivers in the implementation was Warren Burgess (OIM), who has had a long involvement with TMG/OEG. Warren knew there could be benefits to embedding defect elimination on the platform and rebuilding the Andrew Area Ownership initiative.

Warren really led the way by inviting Murray McMillan (a member of a BP defect-elimination team initiative) out to the platform. Following the success of the early visits, Warren had Murray made 'unbumpable' from the flightlist. It is always hard to get a seat on the helicopter and then a bed on the platform; to be given guaranteed access for two years was amazing and woke many people up to the importance and the value of defect elimination.

"On the platform we worked hard at engaging the main crew around defect elimination. This was tough as many wrote it off as simply another initiative that would go away in a few months. We had to relentlessly show up to demonstrate genuine interest, and then help them to prove the value to themselves by creating some early wins. This was a long hard battle that lasted many months, made harder by the shift system which meant really only meeting each shift crew once per month," Murray relates.

One of the other obstacles at the start was engaging people in key and lead positions. Many of them were either wholly skeptical or had unrealistic expectations. Part of the issue was getting management to see the problems clearly, and to respond to them, despite all the cost-reduction measures that had been put in place. The tendency is to see the implementation of the Operations Excellence program as either a magic bullet, or a flash-in-the-pan gimmick: it can be viewed as an all or nothing strategy, when it is in fact neither. With guidance from people like Warren and Murray, and seeing early results from the defect-elimination effort, this soon built enthusiasm around the process.

By March, eight Action Teams had been started, delivering production benefits of 1,860 barrels of oil a day (Bbls/day).

In the early stages of the defect-elimination effort, there was a realization that the scope of Action Team projects was too big (like walls) and that they had to be broken down into bricks. Brian McLeod realized this himself and set up smaller Action Teams. Creating more, smaller teams also helped to engage a larger number of people, operations techs in particular.

By the end of the fourth quarter of 2001, production efficiency reached 86% and average production rates increased from 41,400 Bbls/day in the first quarter to 45,600 Bbls/day in the fourth. Much of this achievement was due to defect elimination, delivered by a number of Action Teams. In particular, these focused on modifying well operating procedures to achieve maximum sand free production rates, optimizing scale inhibitor injection, improving black start procedures and modifying well monitoring procedures. However, 1Q 2002 saw a fall off in efficiency again, with several problems apparently caused by human errors. After investigation, the management team realized that the human errors were actually an incorrect application of the "workaround procedure" to deal with a hidden defect. Knowing this enabled the Action Teams to choose the correct paths to take to eliminate the defects.
In the middle stages of the effort, the drilling operations provided 2 obstacles. The first was well A15, which nearly sunk the Andrew crew. It was the 'well from hell'; everything that could go wrong did, or at least that was how it felt. The program took almost double the time it should have taken. It was a technically difficult well to drill – the very expensive auto-track directional drilling tool got stuck when the wellbore collapsed and it was lost forever downhole. The difficult stage of the well had to be redrilled three times. There were several safety incidents with the drilling equipment (hidden defects) - one failure which stopped the program for 3 weeks, and another for about one week. And all of this was compounded

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by the plant problems causing several shutdowns and power failures. Indeed, these defects had to be resolved by Action Teams before drilling could recommence. The increased activity reacting to these problems put a huge strain on the whole organization; however, the well finally came on line as a good producer by end April 2002. This just left enough time to prepare for the planned 3 week Turnaround in July, in which many design defects were to be eliminated.

The second obstacle was well A16, which has been very successful. This well was not on the plan in July 2002, but the North Sea. Alpha capital investment review in August identified this well as the best investment opportunity in the whole of BP's North Sea program for the rest of the year. The challenge was put to the Andrew team to get ready to drill once again - and this at a time when they were still recovering from the July TAR and having trouble fixing all the power generation turbine problems. Rob Buchan had been Field Manager since May and had seen nothing but performance problems. The big expectation from the TAR was to ramp up steadily to high performance, but because the scale removal job had been cut short, the plant was now severely restricted and would require downtime to fix. On top of this the power generation turbines repair program was extending out beyond year end. With all of these problems facing them, the offshore team could not see how they could get ready for another drilling onslaught.

A leadership forum held on August 28th was a turning point for the Andrew team. The question "When can we be ready for drilling?"was turned around to "What do we have to do to be ready for a drilling start date
of 1 December?" This simple change of emphasis seemed to engage people better and got some amazing responses, like

- "We have got to have 3 power generation turbines running"
- "We have got to complete the unfinished jobs from the TAR"
- "We need a totally integrated plan of ALL platform activities"
- and the most powerful one: "What do we NOT have to do?"

The answer to this question was a huge long list of activities that people were doing – and when they got the permission to park everything on the list, it was like the lifting of a huge burden - participants were then able to focus on the remaining few objectives. There was a tremendous amount of work. The day after this forum, a number of people got together and began to work on the plan. Paul Anderson, Operations Team Leader, was drafted into the office to work alongside the regular planner. Paul brought the site practical experience and helped turn the plan from a wish list to something that really was going to work.

The planning process brought clarity on what could be realistically achieved with the available resources and forced the decisions to defer activities that did not contribute to the drilling preparation (the objective) – even if they were good things to do.

By the end of 2002 efficiency was running at 95% and the team were on their way to achieving a 71 day run without any plant shutdowns, the BEST EVER performance in the life of the platform. And this was done while the Drilling team completed well A16 in record time – the best drilling performance ever on the Andrew platform. This was all achieved by eliminating many design defects as well as defects in a key management process (planning), operations, maintenance and spare parts.

The team at Andrew established values to pursue, and adhered to them. These included having clear priorities, to stop doing what was not going to help deliver on their goals, and to engage in planning with a difference – a plan that would work. This period was a crisis for the Andrew team and they rose to the challenge. While there is still much work to be done, the direction is no longer obscured, the Area Ownership – and now, site ownership – are present again, and the site has been restored to its former position as an example of excellence.

User Conference – 2003: A Forum for Shared Learning

It's not too late to register for the 2nd User Conference sponsored by Ledet Enterprises, Inc. being held in Houston, Texas, April 30 - May 1, 2003. This conference is being offered for TMG and OEG proponents of defect elimination. As a participant, you will see a preview of our new Dynamic Benchmarking applied directly to your site. You will be introduced to our Leadership Forums also, which help site leaders in the site-wide defect-elimination effort. The forums are designed to be held once a month for a year. At the conference we will introduce the concepts from all 12 forums and participants will get to experience one of the Leadership Forums in its entirety.
The Conference will be held at the Sofitel Hotel, 10 minutes from George Bush Airport. There is a special room rate of $US109.00 per night, plus occupancy tax.
The Conference fee is $US750.00 ($US100.00 discount per participant for companies with 3 or more attendees.) This fee includes all conference material plus continental breakfasts, refreshment breaks morning and afternoon, buffet lunch daily, and dinner on the night of April 30th.

Action Teams in Action

Eliminating Bugs...Literally.

What do the Manufacturing Game and Cabot Corporation's Ville Platte workers have in common? They both eliminate bugs.

For as long as anyone there can remember, Cabot's Ville Platte plant has been struggling with how to combat an ever-growing spider population. Thanks to the innovation of one of the defect-elimination Action Teams, comprised of Marcus Anderson, Earnest Ross, Helen Arvie, Steve Presswood, and Dan O'Brien, they now have Spider Brooms.

There will soon be yellow and black brooms throughout the plant in convenient locations to sweep away spider webs and other annoying insects. These brooms have a round head with a telescoping handle to make those "hard to reach" areas much easier to get to.

So the next time any of the Ville Platte workers need to clear away a few spider webs and find a broom located handily for the task, or notice that an area is looking much nicer to work in, they will have an Action Team to thank.

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years, while reducing costs by 19% simply by "turning on" the root cause factors described below.

Driving to the root cause

There are six key elements required for effective root cause analysis. The first factor is "ownership". No organization that we have seen has been able to mandate comprehensive root cause analysis. The front-line workforce must have their own internal drive to get to the root cause to make the approach pervasive. Since building ownership was the topic of our last benchmarking article, we won't spend time here on that subject. The skill to identify the root cause is the next critical factor. This skill building task can seem daunting; however, most small failures can be traced by simple means. A "5 Why" or other similar exercise will typically get to the root cause. The willingness of craftspeople to take the time to write out work orders for root causes that are beyond their capability to fix on the spot is the next factor. These root cause-generated work orders should be a major source of proactive work for the planning and scheduling system. Management support for root cause is the fourth factor. Craftspeople and operators must be given the time and support to find and solve root causes. If the emphasis from management is only on the speed of repair and not the quality, widespread root cause will not become the norm.

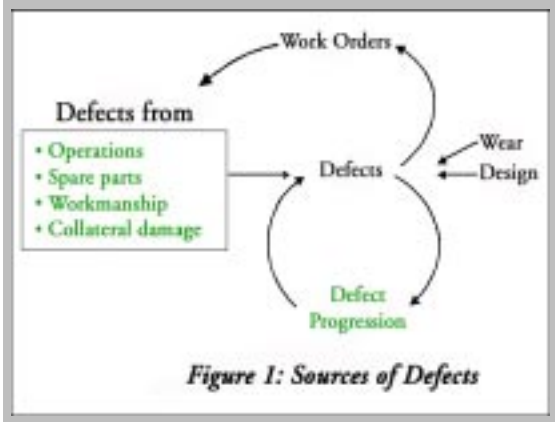

Figure 1: Sources of Defects

The quality of the work order description is also a critical factor. The operator who witnessed the failure will usually have the most insight into the root cause. Unfortunately because of shift schedules and other barriers, it is likely that the same operator will not be around when the repair is made. Without detailed information about operating conditions, it is often very difficult to do anything more than a symptomatic repair. The final factor is the quality of the failure history. Systems that help pinpoint repetitive failures that can be compared to operating conditions and other factors are valuable for tracing root causes.

To understand the relative importance of these factors we ran the benchmarking simulations with each factor independently. The single most important factor is ownership (36% of impact) followed by work order clarity (22%), management support (14%), skills (12%), willingness of maintenance to write work orders (8%) and equipment histories (8%).