Asset Performance Networks

Turnaround Performance Excellence

Breaking the Barriers of Traditional Learning

By

Joe Gandolfo
(Americas Region Turnaround Director, Shell Oil (2007))

Bobby Vichich
(Vice President Turnaround Professional Services, AP-Networks (2007))

Houston Office
18333 Egret Bay Blvd., Suite 640
Houston, TX 77058
Tel: +1 (281) 554-8181
Fax: +1 (281) 554-8585

Introduction

Organizational learning is a fundamental attribute of present day companies who wish to survive in the ambiguous ever-changing world of modern day economies. Companies who are able to learn and adapt quicker than the competition can leverage this attribute as a competitive business advantage. Traditionally, learning has tended to be more focused on training from those more expert and the implementation of known solutions to known problems. A turnaround professional need not look far to see clearly that today's problems are in fact much different from those in only the recent past. Solving these problems with the "Expert" systems of the past most likely will be limiting in some way and will certainly not be delivering the optimal strategy for the new reality.

The idea of going beyond the bounds of traditional approaches to learning suggests that organizational competency in the areas of diagnostics and understanding of causality can be key leverage points for productively adapting to changing conditions – both internal and external – and ensuring delivery of turnaround excellence. This paper presents an overview of the theory and practice behind this approach to learning in three parts:

I. "Current Reality" – Defining the Nature of the Problem
II. "Breaking the Barriers of Traditional Learning" - Theory for Learning and Creating Better Turnaround Performance
III. "Theory in Practice - What Does this Look Like?

This paper is in preparation for a concurrent session in the 2007 NPRA Maintenance & Reliability Conference where further case study examples will be shared to illustrate the application of this in creating better Turnaround Performance in the petrochemicals industry.

I. "Current Reality" – Defining the Nature of the Problem

In a recent industry conference for turnaround leaders and professionals, a question was posed in the plenary group requesting a show of hands of those that had completed a high complexity turnaround during the past two years on time and within the approved budget. For simplicity, *high complexity* was defined as US$20+ MM with significant capital project work. In an audience of over 100 persons, representing most all of the major US petrochemical companies, the number of hands in the air could be counted on less than two hands.

The problems US turnaround professionals are facing are real and quite different than just a mere two years ago:

- Declining availability of skilled workers at all levels including engineers;
- Rampant inflationary pressures on labor as well as materials, fuel and rentals;
- Increased turnaround event complexity driven by longer run lengths and the desire for more project integration;
- Leaner plant workforces to support all of the efforts required to plan and prepare for complex turnaround events;
- Desires for shorter durations driven by significant demand for products and elevated margins;
- Significant impact of timing of work in relation to other work going on in the region.

These problems, in and of themselves, create a world of significant challenge to those trying to plan and execute turnaround events. This is added on top of the ever increasing expectations of society to deliver turnaround events with minimal impact to community and environment along with the internal expectations to deliver with precision against more challenging cost, duration and interval targets. The overall challenge ends up being one of the most formidable in our manufacturing sites.

II. "Breaking the Barriers of Traditional learning" – Theory for Learning and Creating Better T/A Performance.

Understanding this concept in abstract and in the context of application toward the creation of more robust turnaround performance is critical to being able to bring this to bear upon current strategy. Figure A presents a simple model depicting the nature of the balance we seek to achieve in this strategy.

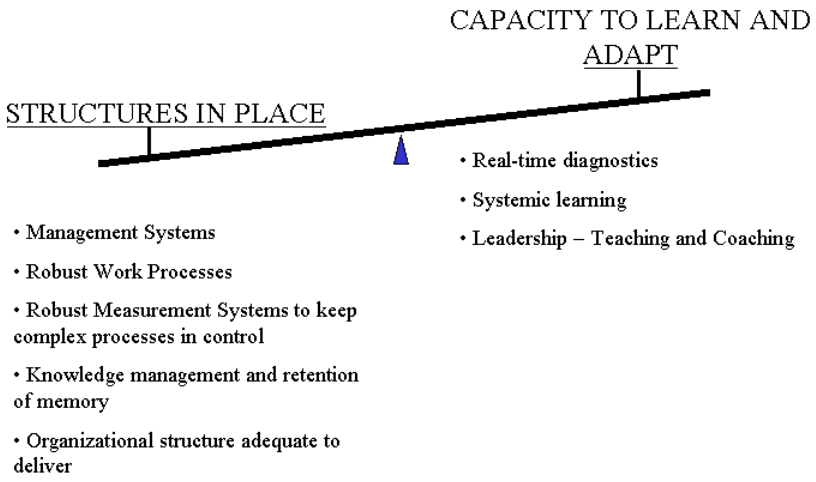

Figure A

In this new learning strategy, the balance between sustaining a structural framework that is complete and robust and informing this structure with accurate intelligence is critical. When this fulcrum falls out of balance in the direction of structure, it dies under the weight of procedure and protocol no longer relevant to the current and dynamic conditions. An imbalance in the direction of learning and adaptation leaves an organization ever in a state of reflection with little capacity to put this improved "meaning" into performance-creating action.

Structures in Place

An effective structure must contain the framework of procedure, process systems and people adequate to execute against a common idea. Effectiveness in this area is what allows large organizations to move together with seamless fluidity in the execution of complex programs – such as turnarounds – while also maintaining a sense of nimbleness in learning and adapting to changing conditions and unforeseen challenges. The following outlines the key attributes of structure necessary:

1. *Robust Work Processes*

   The work process describes the agreed-to flow of how the organization gets from point A to point B. In the case of turnarounds, how the organization completes the tasks in each key phase of strategizing, planning, preparation,

execution and look back. The work process provides the road-map with adequate detail and completeness. The work process is a dynamic instrument which is continually improved through the integration of lessons learned in its application.

2. *Management Systems*

The management system provides the governance over the work process and addresses the important considerations of accountability and assurance of delivery. The management system must be capable of both driving the process as well as executing course corrections to keep the process on track.

3. *Robust Measurement System*

Controlling a process that plays out over a period of many months requires controls that look at “Rate of Progress” and quality of deliverable. Additionally, the controls must be accurate enough to decipher where the weak links are through identification of pre-cursors that foreshadow deeper problems and issues.

4. *Knowledge Management and Retention of Memory*

Many times in plant organizations we see performance shift drastically as key persons move on to different assignments. Experience is lost and the learning curve starts over again often times with the re-invention of processes and systems that had worked just fine. Organizations that are able to manage through this have, in addition to well-thought-out succession plans, knowledge management systems that allow for retention of information and learning.

5. *Organization Structure Adequate to Deliver*

The organizational structure necessary, both in terms of numbers of resources and the composition of players, for high complexity turnarounds is typically not well understood. Sites struggle with delivery of important milestones due to lack of involvement from key disciplines, ineffective use of outsourcing work and stretching key resources beyond their means. Clarity in the design of an efficient organization coupled with clear lines of accountability and authority are important prerequisites for a high performing turnaround organization.

Capacity to Learn and Adapt

With effective structures in place, to be “In-control” an organization wields a very healthy position to be able to quickly adapt to conditions that change or unforeseen challenges that predictably show up in the turnaround world. An organizations’ capacity to learn and adapt is often driven by three key fundamentals: Real-time diagnostics, a capacity for systemic learning and a leadership orientation to teaching and coaching. Each is briefly outlined below:

1. *Real time Diagnostics – Diagnostic Evaluations*

Real time diagnostics, if driven by a healthy orientation toward learning, can provide the necessary "feedback" path to drive a continuous process of accurate course correction over the multi-year timeframe of planning for a high complexity event. In a learning organization, intervention would be both invited and embraced with humility instead of defensiveness and time would be specifically allotted in the process for intervention events. Effective intervention events would include:

- Planned readiness reviews with external participation designed to test and challenge performance and identify opportunities for correction.
- Stage gate exercises that involve senior leaders and stakeholders in understanding preparedness and critical threats that are in need of effective management.

As well, in learning cultures, senior leaders embrace their roles in driving nimble diagnostic structures through their active engagement and exploration of their special roles in removing barriers and creating conditions for success.

2. *Systemic Learning*

In a systems way of thinking, problems are never compartmentalized or viewed in isolation. The systems thinker views reality as the resultant effects of a multitude of complex human and other system interactions that often-times produce results that are neither anticipated or desirable. Understanding the causal relationships that underlie this complexity can generate significant leverage for organizations that create the capacity to learn in this way.

For turnarounds, this should manifest itself in deep-dive causal learning events following each turnaround. While it is important to identify successful practices following turnarounds, the fundamental objective in these learning events must be to understand the system interactions that resulted in undesirable outcomes. Resolving these at the system-level by plowing these lessons into the structures outlined above, can afford significant leverage for future events.

3. *Leadership – Teaching and Coaching*

So often in our plants we see senior leaders that simply delegate the creation of performance to a level in the organization that is fundamentally incapable of accomplishing it. Senior leadership in manufacturing sites must embrace their role in understanding the complex system inter-relationships and both teaching and coaching the organization in a way that removes barriers and creates healthy conditions for turnaround success.

Systemic interferences such as poor communications, unproductive working relationships between functions or distracted critical resources can only be repaired if understood by those accountable.

Site leaders must see their roles in sponsoring the on-going diagnostic efforts, responding swiftly to findings and opening up time and space for rigorous causal analysis following significant turnaround events.

III. "Theory in Action" – What Does it Look Like?

Many owners have some version of a structured framework that forms the foundation for excellence; and several deploy standard cold eyes reviews and post events reports. However, without the approach to systemic learning and the continual pursuit of continuous improvement, the impact of these learning methods is often quite poor. An effective strategy for the successful implementation of the concepts presented in this new learning concept is outlined below.

Real Time Diagnostics - Readiness Reviews

The execution of a formal assurance evaluation program is the primary element of diagnostic learning. Analogous to the preventative maintenance check up, these assurance reviews are designed to identify incremental learning that can be quickly designed back into the overall turnaround preparation phase. Often referred to as peer assist reviews or turnaround readiness reviews, these workshops are most effective when deployed as part of a standard, written methodology that outlines the expectations of the turnaround team & plant management and the boundaries of the review team. This "contract" enables adequate preparation and sets the stage for an efficient, almost invisible, assessment.

Throughout industry, peer assist-type reviews are performed on turnarounds. However, without a structured method to learn and map them back into the work process, improvement is typically random and sporadic, and over time lessons are relearned. The components of a wholesome, structured diagnostic learning event that is poised to deliver meaningful results and enable high levels of readiness are as follows:

1. *Work Process Relevance*

   When implemented consistent with the phase gates of a formal turnaround work process, diagnostic evaluation workshops provide both work process compliance, as well as preparation progress assurance. The definition of formal phase gate deliverables with time relevance to the start of the turnaround, outline the frequency for these formal assurance reviews. Figure B shows pictorially how these reviews can be scheduled in concert with phase gates of a formal turnaround work process.

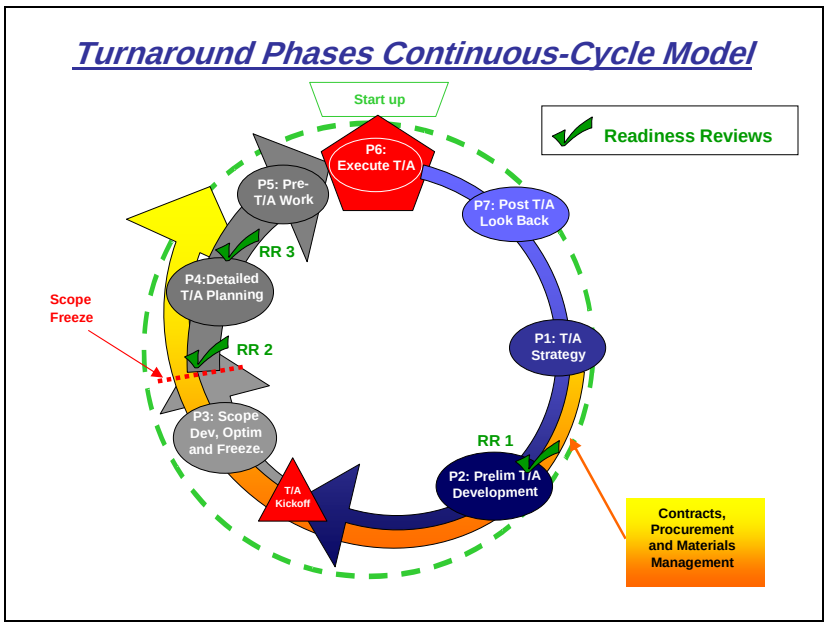

Figure B

2. Structured Method of Delivery

When structure is deployed for the purpose of rigidity, inflexibility, and sameness ("cookie cutter"), it often becomes stale and routine. Predictability and repeatability, however, are a few desirable aspects that structure adds to a methodology.

A structured approach to diagnostic turnaround evaluations is critical for efficiency and consistency. As with any preventative maintenance procedure, it assures that the right techniques will be deployed and the appropriate protocols will be applied to expeditiously diagnose malfunctions and prescribe appropriate adjustments.

A structured readiness review process is one that encounters the turnaround team in natural work groups to ask relevant questions, and to detect elements of deficiency that are not obvious to the team. It is able to avoid becoming stale and routine by deploying the right combination of people, processes and tools to produce elements of freshness and relevancy to articulate deficiencies and predict outcomes.

The final deliverable that a structured method provides is a repeatable approach to a multi-session assurance process. As shown in Figure B, the three diagnostic interventions occur at various phases in time, which means the level of completeness of the preparedness effort will be different. The structured methodology assures that appropriate expectations of readiness form the basis for each evaluation and that each of the three workshops complement and build on each other. The fundamental focus and objectives of these three individual workshop events are outlined in Figure C.

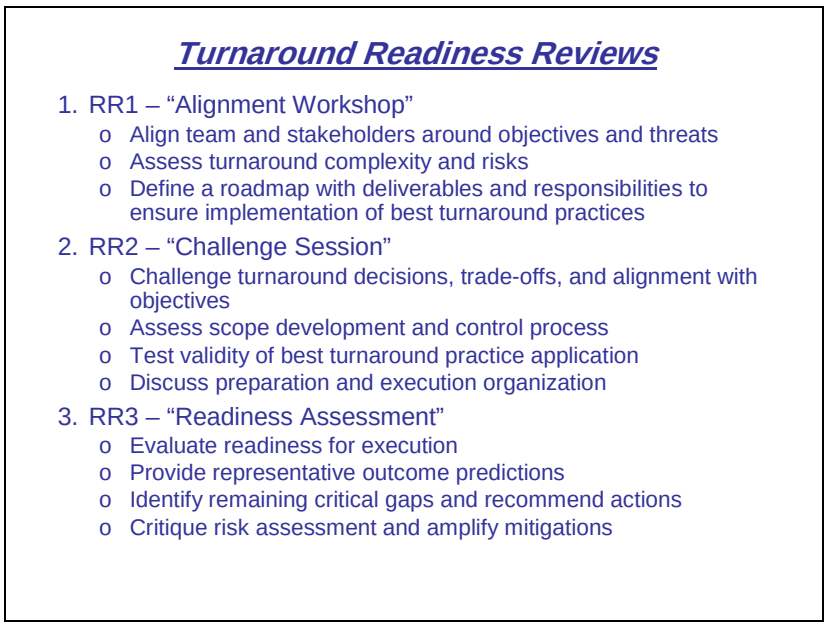

Figure C

3. Benchmark Measurement

As with any scientific approach to problem solving, collection of data is important, but the ability to measure and explain the data relative to a control group is imperative. Applying this concept to turnaround diagnostic interventions, group exercises and interviews are excellent vehicles to collect observations, but the ability to measure the effect of these observations and ultimately predict the final state of readiness is only available through external participation.

For turnaround readiness workshops, industry turnaround practices form the control group, and measurement against these provides a point of reference that can substantiate the definition of readiness gaps. As shown in Figure D, industry practices data and diagnostic tools exist that relate turnaround readiness to actual outcomes. Known as "Turnaround Readiness Index" (or "TRI"), this dimensionless metric is a benchmark measurement of turnaround practices application relative to those deployed in the industry, and has a real effect on outcomes.

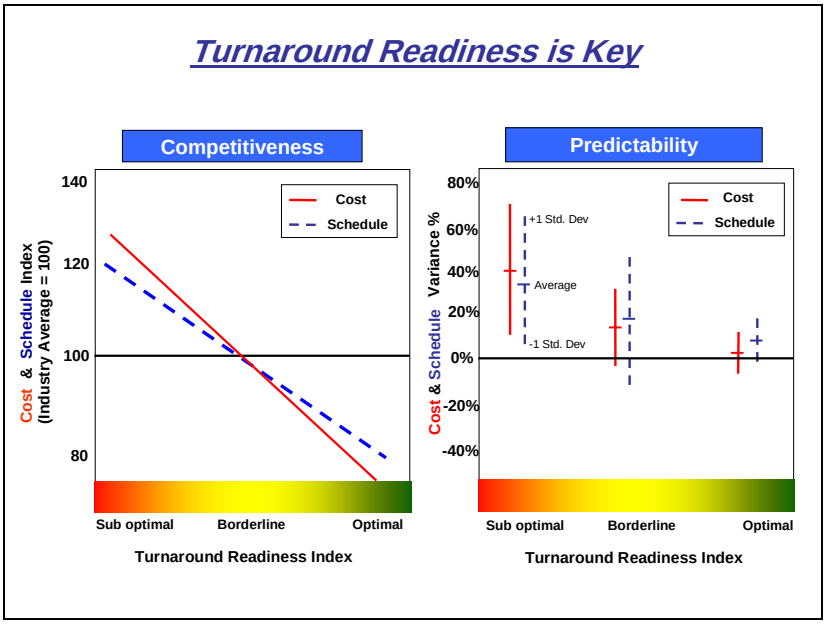

Figure D

4. Case for Action Definition

The final component of a wholesome diagnostic intervention is the ability to quantify the case for action. This information should provide the turnaround team enough justification to obtain the resources and organizational focus required to close the remaining critical gaps, and hence increase the probability for success.

Since the availability of industry data is required to provide this type of quantification, use of tools and processes provided by external consultants is required. Figure E shows an example of a risk-based prediction of achieving the desired schedule premise. The underpinning algorithms that produce this prediction consider both level of readiness and inherent risks that a representative industry turnaround experiences.

Systemic Learning - Post Turnaround Critique

The norm in the industry today is to collect lessons and document them in a formal written report. Unfortunately, due to time constraints and lack of focus, the critical elements of deeper understanding and corporate knowledge management never get explored or implemented. The post turnaround critique is a formal workshop designed to define the root causes of actual turnaround performance outcomes and aid the team in developing relevant solutions that can be designed into the next turnaround preparation effort. Most importantly, this critique is the primary method for influencing corporate learning by changing corporate turnaround systems, processes and behaviors.

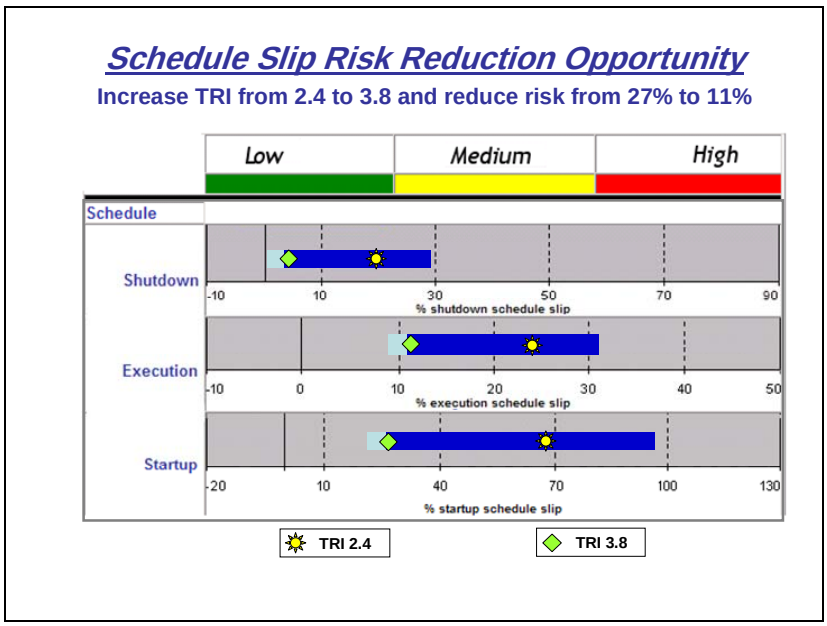

Figure E

As outlined earlier, the existence of a work process complemented with incremental adjustment opportunities of diagnostic learning create a springboard for continuous learning. The post turnaround critique combines these incremental learning events with actual turnaround outcomes and initiates corporate improvement and, ultimately, sustainable excellence. This is the foundational element of deeper systemic learning where longer term systemic improvements are identified, refined into clear cause and effect relationships and then programmed back into the corporate and local systems. This system-level learning cycle is shown diagrammatically in Figure F.

Similar to the diagnostic interventions, the post turnaround critique workshop should be governed by a standard protocol, or methodology which provides predictability and repeatability. The highest value of the post turnaround critique workshop is delivered by the specific differences of this workshop, as compared to the incremental diagnostic readiness reviews. Since this workshop occurs after the turnaround, the existence of actual performance outcomes provides a critical dataset that was not available during the readiness reviews.

The post turnaround critique methodology drives at defining the dominant root causes to the most critical lessons identified during the turnaround. Lesson is meant to imply both favorable and unfavorable outcomes. Industry leaders apply just as much rigor to understanding the causes of things that “went well” as with the “things that didn’t go well”.

The most effective post turnaround critique process is one that lists, but does not analyze the local lessons, but drills deeply into those events that provide corporate learning. Referred to as "*connecting the dots*", this workshop thrives by grouping incremental events and outcomes into larger solution oriented items for exploration, analysis, and ultimately solution.

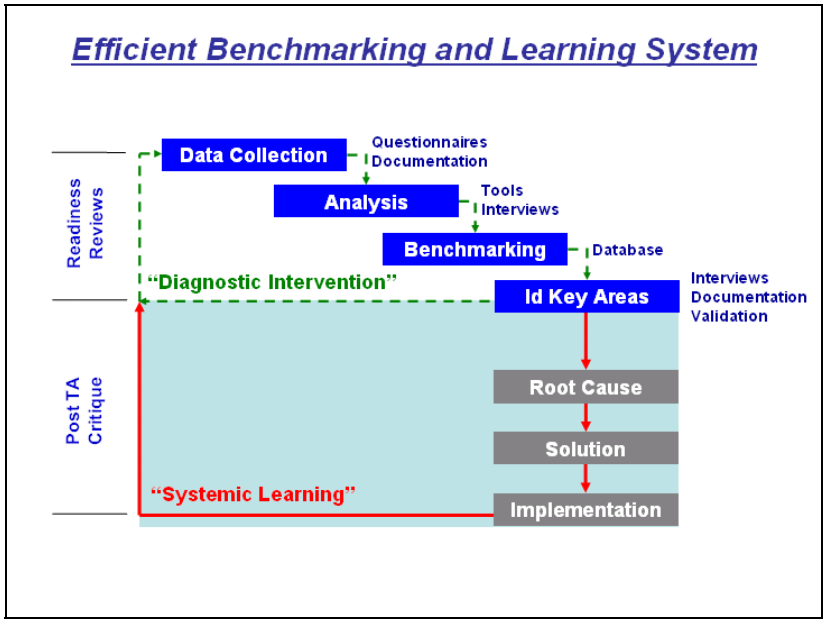

Figure F

IV. Conclusion

Of all the things we attempt to do in our manufacturing environments - daily production and maintenance, project management, organizational changes, etc. - turnarounds present us with the unique opportunity for the entire organization to collaborate in support of delivering not only a successful event but one that stretches the bounds of previous achievements in duration, quality and cost performance. Often times, though the resultant forces of this collaboration do not deliver favorable results. In all cases, there are good reasons and explanations for this, but in no case can these reasons be effectively negotiated without a clear understanding of what's going on to cause them in the first place. The combined "Practices" of real time diagnostics coupled with effective means to diagnose systemic causes against the framework of effective structures to embed and sustain what is learned has been shown to raise the overall capacity to deliver turnaround performance in organizations.