Lean TRIZ

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Introduction

A while back Ellen Domb gave me some excellent advice. I had been talking to her about how hard it is to convince people about TRIZ. "What you have to remember is that people are out there solving problems without TRIZ. You need to find out how they are solving problems at present and how TRIZ might help improve their existing processes." To this end I thought I ought to learn more about Lean techniques. The phrase seemed to crop up very often and I wanted to learn more. Attending a Lean Commandments course at the Manufacturing Institute in Manchester gave me an excellent insight into the mysteries of Lean. The keynote address was given by John Bicheno of the Lean Enterprise Research Centre, Cardiff University. This article is based on the contents of the one day course and John's book "The Lean Tool Box" (Ref. 1)

So what is Lean?

I will quote from Becky Fryer, Process Improvement Practitioner, Manufacturing Advisory Service, Manufacturing Institute.

"Lean is a term to describe a system that produces what the customer wants, when they want it, with minimum waste – it is based on the Toyota Production System".

My personal impression is that Lean consists of best practices, tools and techniques from throughout industry with the aims of reducing waste and maximising efficiency to achieve the ultimate customer satisfaction.

How does TRIZ fit into Lean?

John Bicheno does mention TRIZ in The Lean Box in the section Design and New Products. However there are many more techniques and concepts within Lean where TRIZ might be applied.

Four Objectives and Six Trade offs

Smith and Reinertsen (Developing Products in Half the Time, Ref. 2) identified four objectives for new product development – Development Speed, Product Cost, Product Performance and Development Programme Expense. They recognised that these four objectives had adverse effects on one another leading to six trade offs. These six trade offs are classic examples of technical contradictions. Even more interestingly, the business contradiction matrix within the CREAX Innovation Suite includes amongst its parameters the following matches

4 Objectives	Business Matrix Parameters
Development speed	R&D Time
Development cost	R&D Cost
Product Performance	Production Quality
Product Cost	Production Cost

By running the six pairs through the matrix, interesting principles were suggested. . In total 12 inventive principles were suggested with three principles occurring 3 times, a further 2 twice and the remainder once each.

The current lean approach is to use sensitivity analysis to try to find the best compromise. The TRIZ approach is to find out how to avoid the compromise or trade off. It would be very interesting to carry out this exercise on a real specific problem.

8D

One of the problem solving tools within Lean is 8D an abbreviation for 8 Discipline Problem Solving. Surprisingly it is a 9 step process:

- D0 preparing for 8D
- D1 Assembling the team
- D2 Describing the Problem
- D3 Developing Interim Containment Actions
- D4 Defining the Root Cause
- D5 Choosing Permanent Corrective Actions
- D6 Implementing Permanent Corrective Actions
- D7 Preventative Actions
- D8 Recognition of the Team.

D2 Describing the problem might benefit from TRIZ's many and varied ways of defining the problem. Particularly it would ensure that the right problem is being solved, and would help to identify what contradictions if any, were involved.

D5 Choosing Corrective Actions. This would be the step which would benefit greatly from TRIZ. The many and varied generic solutions available within TRIZ would be of great benefit at this step.

8D is clearly a systematic and successful method of problem solving. I believe it would be become even more effective if some of the tools of TRIZ were applied at relevant points.

Muda

This is the Japanese word for waste. Originally there were seven wastes all based around improving the efficiency of the process and quality of the products. Interestingly Ellen Domb has pointed out that Waste of time, materials, and energy are all parameters of the contradiction matrix. Both TRIZ and Lean have systematic methods to reduce waste.

In recent times more wastes have been added to the list and it is in some of these areas that TRIZ would be relevant.

The Waste of Untapped Human Potential

Let us begin with one where TRIZ can learn from Lean. This waste is failing to use and develop the creativity of all the work force, not just the managers. I feel that at present TRIZ is seen as a tool for managers, whereas, given its simplicity it should be introduced throughout the work force.

Sustainable Lean

A recent addition to Muda is to improve sustainability and avoid wasting the future's resources. In recent times TRIZ has begun to be presented as a tool improve the sustainability of new products and services (Jones & Harrison, 2000 (Ref.3); Mann & Jones, 2001(Ref. 4); Mann & Dekoninck, 2003 (Ref. 5.). In her PhD thesis Jones-Dekoninck (2003), (Ref. 6) identified some core theoretical aspects of TRIZ which inherently support innovation for sustainability: replacement of the design-by-compromise paradigm; the concept of ideal systems that deliver their function without cost or harm; and seeing waste as a resource awaiting a designed use within the system. Jones-Dekoninck also concludes that existing TRIZ tools need not be adapted, provided the user includes sustainability aspects in the system model and attempts to solve problems at a higher levels of the system hierarchy. The European Union is currently funding a project to develop Sustainable Innovation tools for SME's. The majority of the tools to be presented in the training manual are from TRIZ [http://www.leonardo-support.com/default.asp]

Gemba

The Japanese word for workplace and in a Western manufacturing context translates best as the factory floor. (Although in QFD, according to Ellen Domb, it means the place where real things happen so it might be the customers' home, where the product is bought, the vehicle it is transported in, etc.) Lean preaches that problems are best solved by involving the operators of the problem process. Rather than sitting in an office trying to solve the problem, managers are encouraged to "go to the gemba". The emphasis is on teamwork with all members having an equal say. I believe that many of the simple tools of TRIZ would be very useful in this context. Such teams are already used to being involved in problem solving. How much more effective might they be if introduced to the concept of contradictions and the forty principles?

QFD and Six Sigma

Both QFD and Six Sigma have had long associations with TRIZ. Searching the TRIZ_Journal archive gives 104 hits for six sigma, 71 hits for QFD. I will not expand on those topics here.

Pull

This is one of the five Lean principles devised by Womack and Jones and is a concept used to avoid overproduction, (one of the seven original wastes). Rather than having

products pushed through the process irrespective of customer demand, products are pulled through the process by live orders.

I feel there is an excellent analogy between this concept and the Ideal Final Result. Rather than pushing ones' problem to the nearest possible solution, how much better to stand where you ideally want to get to and pull the problem towards you.

Conclusion

In this brief article I have tried to give readers an introduction to some of the Lean techniques. It is a personal view based heavily on looking for where TRIZ tools might be applied. I have been very impressed at the Lean methodology and how it embraces many different and varied techniques. Let us hope that more of the tools of TRIZ will be added into Lean.

About the author

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