



Lean Test Management – The future of testing?

by Iris Pinkster-O’Riordain & Bob van de Burgt

1. Lean Test Management: an introduction

Lean is hot. Lean is everywhere. When you are walking down the street, you will find a lot of companies advertising how Lean they are: Lean building companies or Lean health care. You can buy Lean apps and you can hire consultants specialized in Lean. It looks like Lean methods are applied to various types of businesses and hence various types of processes. What they all have in common is the focus on a complete business process and not just improving one of the process steps. For example, the focus is not just on improving the software testing process, but on improving the complete process from requirements gathering until implementing the solution into production. In this article the authors will investigate whether the future of software testing can also be found in Lean. And as Lean is very often referred to in combination with Six Sigma, this method will also be incorporated in the investigation.

Let’s first have a look at the principles of these two methods.

2. Lean: to create a better workflow and eliminating redundant activities

Lean manufacturing is a company process improvement method. It is developed from a logistics point of view. Lean manufacturing concentrates on banning waste to become quicker and more efficient. Every process that does not add value for the customer is eliminated. The Lean manufacturing philosophy is derived mainly from the Toyota Production System (TPS). It is renowned for its focus on reduction of the Toyota ‘seven wastes’ in order to improve customer value.

The basis of Lean is the **7 wastes** that have to be eliminated. Many of those can be related to testing as well. They are:

- *Overproduction.* Simply put, overproduction is to manufacture an item before it is actually required. Within testing this might be what we want: before the start of the actual test execution the test cases, test data and test environment are prepared. On the other hand are we sure that we make a distinction between effort and depth of testing based on the risks? Do we not have too much overlap between test levels? And what about the potential overkill of test plans? These can all be seen as overproduction within testing.

- *Waiting.* Whenever goods are not moving or being processed, the waste of waiting occurs. Linking processes together so that one feeds directly into the next can dramatically reduce waiting. In testing this is a very common and well known waste: waiting for designs, waiting for the right environment, waiting for support, etc.



- *Transporting.* Transporting a product between processes is a cost incursion which adds no value to the product. For testing we can look at the way information gets to the tester or the amount of meetings there are with the test team.

- *Inappropriate processing.* Often termed as “using a sledgehammer to crack a nut”, many organizations use expensive high precision equipment where simpler tools would be sufficient. We all might have examples of test automation tools or an expensive defect administration of which a big part of the functionality is not used. And we can even think of having too many test cases prepared for a small and simple functionality when we did not consider the product risks and their priority.

- *Unnecessary inventory.* Work in Progress (WIP) is a direct result of *overproduction* and *waiting*. Instead of having good test cases ending up as shelf ware, good version control can make it possible to re-use test cases. Another example might be to



look at the test teams and make them more flexible to work within various projects. This helps having the right number of people at the right moment in your projects. Another example is building more test cases than can be executed in the time available. Test cases that cannot be executed do not add value to the customer.

- *Unnecessary / excess motion.* This waste is related to ergonomics. As testing is not so physical it might look difficult to relate this waste to testing. On the other hand we could translate this as the amount of releases to get to the required quality. The more (small) releases per period, the harder it might be to plan, prepare and execute the tests for these releases.
- *Defects.* Having a direct impact to the bottom line quality, defects resulting in rework or scrap are a tremendous cost to organizations. Here a distinction between defects in the testing process and defects in the product under test can be made. With testing we help the organization to eliminate the waste of product defects. Every product defect a test team finds can be fixed before going into production. This is probably the most recognizable waste related to testing. Defect in the test process itself is of course also a waste we have to be aware of. Improvement plans should also include our own test processes.

3. *Six Sigma: improvement of processes and increase in the predictability of the outcome of the process*

Six Sigma is a quality management method that offers a framework to manage quality. By many it is seen as a successor of Total Quality Management (TQM) with a high use of Statistical Process Control (SPC) as the underlying method. Processes can be controlled when you know how the flow of each process is and know what you have to measure. To measure is to know! Measuring is the basis of Six Sigma. The aim is to work smarter and get a higher quality. Sigma (σ) is the standard deviation from the average. It is a statistical term that measures how far a given process deviates from perfection. Six Sigma was founded at Motorola in the mid-eighties as a solution for problems with product quality and customer satisfaction. Six Sigma got its big popularity when it was used on a broad scale at General Electric and gained billions over a period of multiple years.

Six Sigma has four key elements:

- The customer is the starting point. Testing should focus on adding the best value to all stakeholders. E.g. set priorities based on a product risk analysis.
- Improve your test processes. Use models and methods as reference, but not as target. Use what suits best to the organization's own processes.
- Ensure teamwork. Not only within the test team but also with the other members within your projects.
- Collecting and analyzing data. Improving the test process cannot be done without measuring the effect of the changes made in the process. Keeping metrics, analyzing them and taking action should become a company's second nature.

4. *Lean Test Management: managing the testing process to improve the quality of the test object to be measured within the planned time and budget*

Within Lean Test Management the best of the Lean and Six Sigma theory is combined with testing. Within Lean the focus lies on

eliminating activities that do not directly add value to the customer. (Lean) Six Sigma focuses on achieving a higher quality by working smarter.

Although the Lean method emanated from production and production related industries and Six Sigma is not specifically designed for testing, the principles are also excellent to use in testing processes. An example: within the testing process there are often delays because the testers are waiting for the designs or because the test environment does not meet expectations. By investigating this process, using existing techniques from Lean and Six Sigma, we can improve this process so no valuable time will be lost.

It is often tried to implement improvements to processes, which was not always successful. Why should it succeed when using Lean Test Management? Lean Test Management can be seen as a good addition to existing test improvement models. These models are based on a benchmark against which your organization is compared and focus mainly on the test process itself. The improvement techniques associated with Lean Test Management „talk“ from your organization. The specific situation of an organization is thoroughly investigated and based on the results, the necessary improvements are considered. Not only testing is investigated, but also the surrounding processes and their interactions with the testing process are not forgotten. A lot of waste is often initiated on the interfaces of these processes and in order to make the combined process more „lean“ it is a good idea to focus on those borders and get rid of that waste. There is much to be gained. Proven techniques and tools from Lean and Six Sigma will help achieving your improvement goals.

5. *A roadmap to Lean Test Management*

We think the best way to start implementing Lean Test Management is to start with the first phase of the Six Sigma DMAIC cycle. DMAIC is an extended version of the Deming cycle (plan, do, check, act). In addition it has a more important place for measurements and control. The following phases are part of the DMAIC cycle:

- **Define**, to agree on what the (improvement) project is. Make sure to involve people from the whole process and not only testers to avoid sub-optimization. Sometimes the discussion between these people already reveals quick wins in the process because they are better aware of what is expected from each other. Typical Lean / Six Sigma techniques that can be applied here are SIPOC and Value Stream¹.
- **Measure**, evaluate the existing measurement system, observe the process, gather data and map the process in more depth. The areas of improvement defined in the first step already give an indication of problem areas in the process. It is important to know what the most important causes of



¹ The techniques used in this article are picked by the authors as useful for testing. Within Lean and Six Sigma a large amount of other techniques are available that you could use.

these problem areas are, therefore we need to measure. The 20-80 rule applies here. Solving 20% of the most important causes might give you an 80% improvement in the problem area. A typical Lean / Six Sigma technique that can be applied here is the Pareto chart.

- Analyze, use collected data to confirm the source of delays, waste, and poor quality. After the problem areas in the process have been measured, the data to find the real source of the problem can be analyzed. It is important not to skip this phase, even when you think solutions are obvious after the Define and Measure stages. You need to investigate deeper in order to come to the best solutions in the end. Typical Lean / Six Sigma techniques that can be applied here are the 5 Why's and Ishikawa diagrams.



- Improve, to make changes in a process that eliminate defects, waste, cost, etc., which are linked to the customer needs identified in the Define phase. The Analyze phase made the waste in the processes clear. Now it is time to get rid of that waste by improving the process. Use existing test process improvement models and test methods as reference, but not as target. Use what suits best to your own organization and processes. A typical Lean / Six Sigma technique that can be applied here is the Pick Chart.

- Control, to make sure that any gains a team makes last. Use the same measures as used in the Measure phase to monitor the processes and make sure that there are fewer deviations from the optimal process. A typical Lean / Six Sigma techniques that can be applied here is the Control Chart.

As indicated in each phase described, there are a lot of ready to use techniques available that can help you to start improving right away. If you want to know more about the techniques, the references at the end of this article are a good start.

6. Conclusion

After describing the principles of Lean and Six Sigma and how they can be applied to testing, the authors hope that you will also have a good feeling that combining these methods will lead us into an efficient, cost effective and high quality future.

Summarizing, by applying Lean Test Management,

- the test process will become more efficient. All activities that have no direct added value for the customer have to be deleted;
- the quality of products will increase by working smarter;
- test process improvement will start from within the organization and existing processes, and therefore the best tailored results can be obtained;
- insight will be gained into the processes around testing that also need improvement in order to make the testing process more efficient.

References:

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> biography



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