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Quality Quandaries*: An Efficient Public Sector

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INTRODUCTION

Lean Six Sigma originated as a combination of two improvement methodologies in manufacturing; Lean and Six Sigma (Liker 2004; Montgomery and Woodall 2008). These improvement methodologies were applied by companies such as Toyota and General Electric and focused on improving quality and reducing cost. After generating considerable financial success, other sectors in the economy started to adopt the methodology as well. The financial service sector was among the first to acknowledge that considerable improvements could be made by focusing on the quality and efficiency of processes.

Implementation of Lean Six Sigma projects in financial services meant a change in mindset by realizing improvements through process thinking. Although opponents claim that the methodology is unsuited for financial services, organizations using the methodology claim substantial benefits (De Koning et al. 2008). This helped change the opinions regarding the viability of Lean Six Sigma outside manufacturing (Snee and Hoerl 2005).

The next sector implementing the methodology was health care. In a sector where employees were performing highly specialized work, "products" were humans and thus diverse, and resistance to process thinking was considerable. However, after implementing the methodology, improvements were realized in terms of length of stay, utilization, and patient safety, among others (Niemeijer et al. 2011).

Currently, Lean Six Sigma is slowly finding its way into the public sector. Fueled by the economic downturn, the public sector is adapting the mindset of running processes more efficiently.

UWV is a large Dutch government organization with 19,000 full-time employees (ftes) responsible for social security related to employment. With approximately 130 offices throughout The Netherlands, UWV helped 134,000 clients find jobs in 2010.

UWV commenced a series of trainings to prepare personnel for the execution of the Lean Six Sigma methodology. This investment is starting to repay itself through successful improvement projects. This article describes a case study of one of these improvement projects of UWV along the common define–measure–analyze–improve–control (DMAIC) structure used in Lean Six Sigma projects (De Mast et al. 2012).

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DEFINE PHASE

The initial aim was to improve the process of handling WIA (Work and Income according to labor capacity Act) documents; that is, records relating to the unemployment benefit administration. WIA is a Dutch law that protects employees who are unable to work to their full potential due to sickness. UWV carries out this law by medically assessing clients, paying them their benefits, and helping them find new jobs.

This process of handling WIA documents involved a range of different steps, such as assessing the file, a medical assessment of the person involved, the creation of an extended file, and digitizing this file. Each of these steps proved to be quite extensive. We chose to focus solely on the final part of the process: digitizing WIA files (see the suppliers–inputs–process–outputs–customers (SIPOC) diagram in Figure 1).

Hence, the aim of the project became to shorten the time to digitize the employee's documentation. The shorter the time required to digitize, the faster an employee can be served and the sooner an employee can get back to work. This reduced the scope significantly and, in a situation where political forces could be expected, introduced a welcome reduction in the number of stakeholders. Nevertheless, digitizing WIA files is a complex process on its own, with the process scattered over two locations (which we will refer to as west and south, approximately 100 km apart), each with their own team and manager. The total process involved 13 fte, of whom most were active in the south.

At this stage, it was expected that improvements could be made in the form of throughput time and rework. Due to the number of people involved in the process, yearly benefits of $250,000 due to a reduction in required personnel were expected.

At this stage, the project leader put serious effort into mapping the process on a microlevel. Grasping the actual situation in the process (Gemba study, see Liker 2004), sitting next to employees, and organizing workshops, an extensive microprocess map was developed. In addition, the detailed microprocess map was displayed at both locations to stimulate additional refinement.

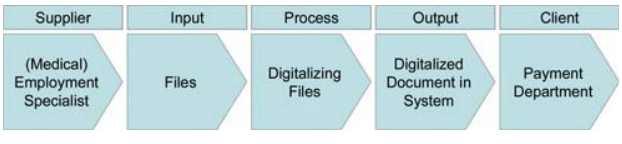

FIGURE 1 **SIPOC diagram. (Color figure available online.)**

MEASURE PHASE

The first step in the measure phase comprises the selection of clearly defined, quantifiable metrics, so-called critical-to-quality metrics (CTQs). Throughput times were split into waiting times and processing times, leading to the following CTQs:

- Waiting time
- Processing time
- Rework

Because measurements were needed for two locations, an additional project manager was assigned. Before collecting data on these CTQs, the project team organized a brainstorming session to map possible complications resulting in invalid measurements. As a result, the measurement form was adjusted and clear definitions on measurements were agreed on. To deal with possible unforeseeable complications, a pilot was organized. This resulted in the decision to measure processing times on a higher level, by combining multiple microprocess steps performed by a single person.

Data collection was begun after these improvements. To prevent a sampling bias, every 20th file was taken at the start of the process. In the course of one week, this resulted in valid data on 45 files.

ANALYZE PHASE

Information on the measured CTQs was used to determine the baseline of the problem:

- Average waiting time per file was about 54 hours.
- Average processing time per file was about 40 minutes.
- Average rework per file, although known to exist, was not found in the measured sample.

Given the unbalanced ratio of waiting time versus processing time, it was clear that waiting time was unacceptable and a great source of potential improvement. Because it was expected that the overall design of the process was responsible for the undesired performance, it was decided that the approach would not be to search for influence factors for each CTQ separately but to focus on mapping waste for the process as a whole. This was expected to greatly reduce waiting time and have additional effects on both processing time and rework.

The extensive efforts put into forming the detailed process map formed a solid basis for the analysis of this process. By augmenting the microprocess map with processing times, waiting times, and standard forms of waste, a so-called value stream map (VSM) on the current state (see Figure 2) was created (De Mast et al. 2012; Liker 2004).

The VSM is far too detailed to be properly depicted here. The main purpose of showing it here is to illustrate the high complexity of the process in combination with the large amount of waste (depicted by the red symbols), indicating the great potential for improvement.

The top half of the VSM illustrates the process in the south, with the process starting at the top right. The process follows the arrow from the top right, starting in the south, to the top left, where transport from the south to the west occurs, to the bottom right, where the process in the west ends. Microprocess steps performed by single employees are clustered, indicated by the frames. Globally speaking, the process in the south is characterized by complexity, whereas in the west, due to transport and being a physically different location, the process is characterized by a large amount of checking and documenting. In addition, the present "blame culture" and the fact that the west had a different manager stimulated this type of waste in the west.

In order to increase awareness and create support for the improvements, the project team launched a Lean Six Sigma workshop for the shop floor personnel to familiarize workers with concepts such as waste

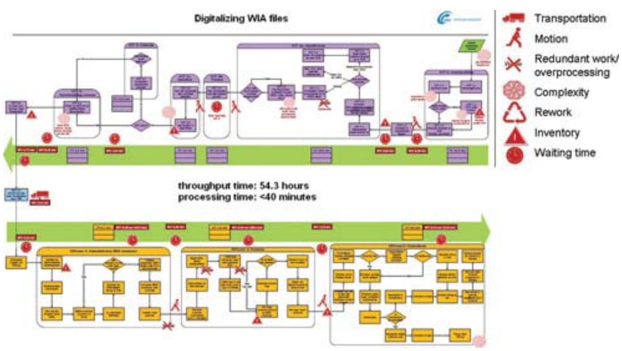

FIGURE 2 **Value stream map: current state. (Color figure available online.)**

and improvement. Personnel played the so-called Lean Game, a role-playing game in which everyone participates in a process, with the purpose of detecting inefficiencies and implementing improvement measures. Shop floor personnel participating in the game saw the illogical design of the process at hand, not realizing that the process bore great similarity to their own process. After the participants willingly improved the process, they were informed of the significant parallels to their own process. This not only trained employees in the improvement methodology, but it increased their enthusiasm and lessened resistance to improvements proposed by outsiders.

The most important forms of waste detected in the current process were as follows:

- Transport: Physical movement of the files from the south to the west accounted for about 22% of the waiting time (approximately 12 of the 54 hours).
- Complexity/rework: Depending on their type, files are allocated a certain code. There are over 400 different codes that employees have memorized and enter into the system manually. System data showed that this resulted in rework for 1.8% of the files. Many of these errors were not detected until after movement of the file to the west. Though the west could fix these errors, common practice was to send it back to the south, thus accounting for an increase in waiting time.
- Waste: Files were repeatedly scanned, printed, scanned, printed, etc.
- Movement: Shop floor personnel made abundant use of printers. However, impractical placement of printers caused unnecessary and abundant movement.
- Inventory: Files at the end of the process were stored longer than legally necessary. A third party was contracted to facilitate this, causing this form of waste to have a direct financial impact. In addition, bulk processing led to inventories at workplaces due to transport.

IMPROVE PHASE

Although the project team had certain straightforward ideas about improving the process, an additional meeting was organized to allow the shop floor personnel come up with improvement measures themselves. The risk of resistance to change was thus kept to a minimum. Shop floor personnel from both locations were brought together, aiming to increase team spirit and ameliorate the prevalent "us versus them" feeling. This meeting resulted in small improvements, mainly related to working circumstances.

In terms of improving the CTQ waiting time, however, the most obvious improvement was to cut out the necessity of transport between both locations. One way to achieve this was to provide the south with all of the necessary equipment. Doing all work in the south, there would be no further need to keep the employees in the west up and running. This measure required new scanners, including the necessary infrastructure, to be placed in the south.

This seemingly straightforward measure was delayed by disproportionally large estimates of the financial impact and possible complications of this measure. Due to an information asymmetry, the project team decided to call in specialists for a second opinion. In the meantime, alternative improvement measures had to be investigated. Because these alternatives all had significantly less financial impact, the second opinion, which pointed in a completely different direction, supporting the original improvement plan with a sound business plan, was welcomed. Original plans were resumed and an action plan was initiated to acquire new scanners for the south.

Additional improvements consisted of the following:

- Discontinuation of the unnecessary storage of documented files.
- An automated check on the 400 different file codes.
- A switch from bulk processing to one-piece flow by working in smaller batches.

Total financial benefits were estimated to be $325,000 per year, of which $265,000 was in the form of fewer personnel, and $65,000 was due to ceasing to physically store files longer than legally required.

As is typical for improvements relating to redesigning the process, the impact of improvement measures is formed by anecdotic evidence. Reliable quantification of the improvements on the CTQ waiting time can only be assessed after performing an additional measurement. At this stage, waiting time is expected to be reduced from 54 hours to approximately 31 hours, with processing times estimated to be around 30 minutes.

CONTROL PHASE

The control phase aims to guarantee the sustainability of the improvements. Without a proper execution of the control phase, processes tend to revert back into their old, undesired state. Because the process was largely redesigned, the first step was to clearly define the new process. This would serve as a baseline for the improved situation (see Figure 3).

As can be seen, the new situation is in one location and the number of process steps has decreased dramatically. The process ends with a single check, rather than the multiple checks required for the old situation. An additional advantage is that errors can be restored immediately. Rework is reduced by adding automated checks throughout the process.

Errors are documented and evaluated on a daily basis. In addition, it is common practice for the shop floor personnel to finish up the entire workload within the same day, guaranteeing a cap on throughput time.

Nevertheless, it was recognized that this improvement project is only the first step in improving this process and that there were be plenty of improvement opportunities in the new process. In particular, because the improvement measures had a quite dramatic impact on the process, it would not be realistic to expect the improved process to work flawlessly from the start. Continuous improvement of the new situation is facilitated by training a Green Belt involved in the process and allocating time to run additional refining projects.

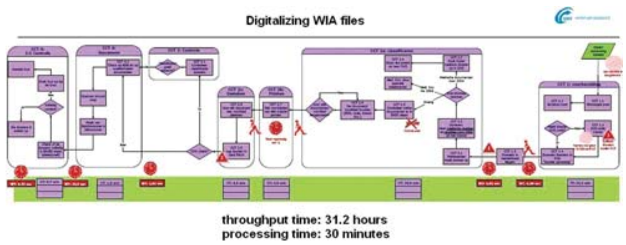

FIGURE 3 Value stream map: future state. (Color figure available online.)

CONCLUSION

This article reflects on a case study of a Lean Six Sigma improvement project in the public sector. Although the methodology originated in manufacturing, the general DMAIC structure is perfectly applicable to the public sector. As was the case in financial services and health care, the public sector also has its own specific challenges to overcome. Snee and Hoerl (2005) noted that in financial services there is the general unavailability of useable data. In the public sector, this could be the political forces. Of course, given the scarce available evidence, it is premature to base such a conclusion on one case study alone.

However, typical for this case study is the latent presence of opposition to improvement and the constant anticipation with which the project team thoughtfully unfolded the project. This could indicate numerous things, including that this is a type of organization that is less willing to change or new to the concept of change or that the resistance of certain individuals due to a specific hierarchical or bureaucratic structure can make it difficult to depart from the status quo. It points in a direction where the presence of a champion with a sufficient amount of decision-making power could be an important determinant for the success of the project. As cases based on improvement projects in the public sector increase, more conclusions can be made.

It is easy to say that efficiency gains are easily and readily available in the public sector or that the public sector's mindset is influenced by governmental attitudes. Perhaps the public sector has never felt the financial pressures that industries do. The fact is that more government organizations are facing mandatory cost cutting and have no choice but to perform more efficiently.

As in the financial service sector and health care, the public sector has its own challenges to overcome when implementing lean six sigma. It is too early to determine what those issues are.

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