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Lean Six Sigma at Statistics Netherlands

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At Statistics Netherlands (SN) we have embarked mid 2014 on a large institute-wide program to implement Lean Six Sigma (LSS) as the standard method for optimizing operational processes. In general, the points mentioned by McSweeney and Moore [3] are very familiar to us; both intentions and the first striking results but also the issues we encounter. In particular we recognize the importance of the support of the director general and the senior management, LSS has at SN. The combination of a bottom up (enthusiastic belts) and top down (committed management) approach was very fruitful for SN.

In the following comments we will complete the picture of the use of LSS in a statistical agency from our experiences.

The goal of introducing Lean Six Sigma at SN is to enable the organisation to carry out process improvement of operational processes in a structured manner and to build a culture of continuous improvement in which process optimization is obvious and routine. Process improvement should make a significant contribution in coping with the efficiency targets, and being able, despite these budget cuts, to keep up quality and free up resources for modernisation.

To this end, a training and awareness program of 15 Black Belts, 80 Green Belts, 175 Orange Belts and 80 Champion Belts has been commissioned and is being executed in "waves" of about 4 months. The trainings program will run well into 2016. Basic principle is that education and practice go hand in hand. As a consequence 10–15 simultaneous Lean improvement projects are executed during every wave. At the moment we are in the middle of wave 4 which is to end at September 2015. Our aim is to have one active Green Belt with experience working under the Define, Measure, Analyse, Improve and Control (DMAIC) approach of Lean Six Sigma, in almost all 80 teams[1] in December 2016. One year after the start of the trainings program we now have 7 Black Belts, 56 Green Belts, 127 Orange Belts and 90 Champion Belts at SN. Moreover, 62 improvement projects have been started from which 25 have been completed successfully, 33 projects are still running and 4 projects are stopped. The whole program is coordinated by the Department of Methodology and Process Development.

A first evaluation of the results so far gives an encouraging picture. Green-Belt projects are relatively simple projects related to a sub-process within a team. The nominal cost per Green-Belt project is around 500 hours. These relatively small scale improvement projects still have ambitious goals and achieve them also fairly easy in most cases with relatively simple solutions to the problems identified.

To give some examples:

- The turnaround time of a certain quarterly output process needed to be reduced from 9 working days to 5 working days in order to meet European obligations. The main causes for the long duration were found in insufficient preparations, in suboptimal planning and in the large amount of time spent by co-workers on checking the correct-

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[1]Teams are the units at the lowest organizational level of Statistics Netherlands. They consist of 15–25 staff and deal with one or several closely related statistical processes.

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ness of copy-paste actions between worksheets in excel. Preparations were determined and planned, a new work planning has been made, a planning board has been introduced and a simple program written in Excel Basic now checks the worksheets automatically. The turnaround time of 5 working days is now easily met. In the next wave, the results of this project are reused in another process with a similar problem.

- The 2nd line helpdesk support for reports, complaints and back office struggled with a large backlog and did not respond to complaints and problems within the agreed timeframe. In the last three years 33% of the responses were too late. The aim of the project was to reduce the number of complaints not responded to within the agreed timeframe to 1%. The main causes for the problem were found in the disturbance of the workflow due to the bulk of reports when a questionnaire server was not accessible. The most important improvement which had the most impact was to reroute these reports to a calamity queue and answering them in batch. A post-test after three months showed that the complete backlog was gone and all reports and complaints were responded to within the agreed timeframe.
- The workload in a particular team was very high. One of their processes, a certain Eurostat delivery process, was selected for an improvement project. The goal was to reduce the processing time of this process by 25%. An important cause for the high workload was found in the high diversity in tooling they used which were not flexible and suitable for the annually changing demands from Eurostat. Another cause was found in work planning. By using a dataset that is earlier available a peak in workload is prevented. A tool expert has improved a number of scripts and created a structure. Based on these new scripts and the accompanying documentation and training, staff continued the further improvement of the other (55) scripts. This resulted in a reduction of processing time of 40% and this was expected to increase to 78% in a few months.

Although exact figures are hard to give, from the first completed improvement projects we estimate on average, with a fair margin of error, that it might be possible to achieve an improvement of 25% over all processes; improvements can be in terms of turnaround time, processing time or quality.

The Lean Six Sigma DMAIC approach proved very useful for the optimization of our different types of processes. We carried out improvement projects in statistical processes, processes which are more logistical in nature, and management and administrative processes. The tools which are used vary across the projects. In particular, the ability to use statistical analysis is limited to the administrative and statistical processes because there we have a sufficient mass of process data. Tools which are frequently used are:

- Value stream mapping for analysing the current state and designing a future state of a process,
- SIPOC (Suplier, Input, Process, Output and Customer): a simple method to map a process in order to give a high level overview of the process,
- Ishikawa: a fishbone diagram to break down root causes that potentially contribute to a particular effect.

Referring to the TIMWOODS[2] waste classification McSweeney and Moore mentioned, common types of waste we encounter in our projects are transport (of files), waiting, over processing, defects and skills. With respect to defects it appears that internal deliveries between teams or between processes often do not meet the expectations of the receiving party while the delivering party is not sure what criteria they must meet. The office automation skills are often too limited to choose convenient solutions in daily operations. A little help in the improvement of processing with Excel and Access or a simple SQL script can yield much profit in these cases.

At the start of a project, there is often a certain degree of resistance among employees. “Our process is already optimal”, “we really can’t do more in less time” are quotes we have heard often at the start of a project. However, during the project, staff finds that the problems they encounter are taken seriously, their input is valuable and that they can bring about much change themselves. This creates increasing enthusiasm. For them the working together and exploring together is often the major plus of this method.

We anticipated, similarly to the Irish experience, reluctance to cooperate because staff would feel that their own jobs might be at stake. However, from the very start, management made it very clear that the budget cuts which are being faced by Statistics Netherlands,

[2]TIMWOODS is the classification within LSS of the various types of waste and slack in a process: Transport, Inventory, Motion, Waiting, Over-processing, Over-production, Defects and Skills.

are a political fact and that the distribution of these budget cuts across teams was to be regarded as given. So, in effect, LSS was only the way by which these given reductions in staff were to be realised, and not a way to press even harder on the organisation. There was not a disadvantage to being selected for a LSS project, but instead it was to make the goal of staff reductions easier to reach. Also, any improvements over and above the planned reductions are available to the team for initiatives on new statistical output.

The advantage of the DMAIC approach as we have experienced is that it is a very structured approach in which the scope is clearly defined and is kept small; also in this approach improvements within the sphere of the team's own influence are identified so that these can be implemented easily and results are quickly visible. After that, we look at whether the results may be useful in a broader sense or whether related sub processes, which were initially outside the scope, can also be improved.

Of course, local solutions for suboptimal processes are usually not desirable; therefore it is important to have a clear and overall picture of the problems and the solutions in the LSS projects, analyse them and make the connection with process development. Clearly, we see this as one of the challenges for the coming years.

After closing a successful project we often hear from the team that they could have solved the problem too without LSS, and that it was only common sense they used. We think this is true but the point is that in practice lots of problems are nòt solved and the use of this method pushes the organisation to actually improve. We also agree with the last part, it is indeed often common sense and the solutions are often quit simple, not complicated. But at the same time this makes LSS powerful.

Despite the good results so far, we mention three reasons to worry about with respect to the sustainability of our approach. After a very good first wave of projects we have encountered in the later waves too many projects running out time in terms of their planning mostly due to resourcing problems. Secondly, not enough green belts pick up a second improvement project within a reasonable time. And thirdly, from the beginning we had to put much effort in defining projects. Despite the availability of the many good project examples we have now, managers still find it difficult to define projects. To keep this train running, a lot of communication is needed and targeted actions to solve the mentioned problems. Our central pool of Black belts will address these issues in their work as ambassador, coach, trainer or project leader of a LSS project. But it is equally important that (top) management remains visible in expressing their support to the LSS program and the goal they want to achieve, as was also mentioned by McSweeney and Moore.

From our experience we can conclude that there are many improvement opportunities in our processes which can be exploited by investing time and attention. So far, the LSS method and the program we embarked on certainly helps SN to structurally exploit these opportunities in an efficient manner. However, we also think that in order to achieve a continuous improvement culture, it requires more than the LSS project based approach: it has to be embedded in a broader and more general culture of quality. In addition to LSS we are therefore currently experimenting with Lean Operational Management (LOM). Preliminary results of LOM at SN show that this method can be complementary to the project approach. In the LOM approach complete teams are involved and improvement will become a part of the day to day's work for them, in contrast to the project approach where only project team members are involved.

LSS may be compared to Total Quality Management (TQM) and Total Survey Error (TSE) paradigms, two important quality frameworks that have been proposed and sometimes applied in statistical institutes. TQM is a general organizational philosophy for focus on quality; in particular its emphasis on, amongst others, customer satisfaction and continuous improvement, makes connections with LSS possible. TSE is more directly geared towards surveys, and focusses on the components and causes of the quality (*total error*) of the statistical output; see Groves and Lyberg [2] for a survey and Biemer and Lyberg [1] for a more extensive exposition. Because TSE leads to identification and measurement of errors at all stages of the statistical process, LSS may be seen as a practical way to implement TSE. The main difference seems to be that TQM and TSE are inherently looking at processes, or even the organization, as a whole, and are thus more suitable for the planning and design of new processes, whereas LSS may also be applied at some specific stage of a process, i.e. locally; but of course LSS may also be applied to a process, or a chain of processes, as a whole. So in a broader sense, we feel that LSS is a very effective and practical way to implement ideas from TQM and TSE.

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