Improves on profiling Enterprises

Summary

Statistics Netherlands has invested in the past three years in Lean Six Sigma as a method to improve its statistical processes. The method uses the Define, Measure, Analyse, Improve and Control (DMAIC) approach. In this paper we will discuss one of the many Lean Six Sigma Projects that were carried out. The project had the objective to improve the efficiency of the profiling of large enterprises in the Dutch Statistical Business Register. Profiling is used to determine the structure, core attributes and dynamics of those enterprises. The profiling activity is standardised and centralised within Statistics Netherlands to support statistical coordination. For large enterprises, profiling is labour-intensive. The intended gain of efficiency was necessary to be more efficient in general, for the extension of the coverage of the business register and for improvement of the effectiveness of profiling. The objective of the project was to reduce the number of hours worked on profiling with 45%.

The project was initiated by the idea that the profiling process, as it was executed during the past 10 years, could be more effective and efficient. The needs for profiling from statistical producers were not sufficiently known and statistical producers were not familiar enough with the products and services offered by profiling. Prior analysis with the use of process mining already indicated opportunities to improve.

Within the project three root causes were found for the current inefficiency of the profiling-process: overprocessing (the process contains unnecessary steps and loops, i.e. no value is added), overproduction (more profiling is performed than needed by customers) and waiting. For these causes, we worked out improvements and partly tested them by the use of experiments. The experiments showed that the proposed improvements were acceptable and realistic. We expect that they are sufficient to realize the 45% efficiency gain. The improvements were implemented in the first half of 2017. To validate the effectiveness of the measures, the efficiency will be measured and managed during the subsequent 12 months.

The Lean Six Sigma approach is quite general and can be applied to improve all kinds of statistical processes. The case study on profiling is a showcase to illustrate this.

Profiling as a part of the chain to produce economic statistics

Profiling determines the units to produce economic statistics. The structure, main attributes and the dynamics of enterprises are processed. Statistical departments use this information for data collection, editing, estimation and integration. Changes in the statistical business register (SBR) influence the outcomes. A thorough and timely analysis of this influence is necessary to produce statistics of good quality. Larger enterprises have more impact. Therefore, and because manual profiling is costly, profilers mainly evaluate changes in the most influential enterprises. For profiling of the 350 ‘most complex’ Enterprise groups in the Netherlands, 4 profilers are occupied. For the next segment of 950 Enterprise groups and additional staff of 7-8 is needed. Both segments together are referred to as Top-P enterprise groups. The scope of the project was limited to the second segment of 950 Enterprise groups within the Top-P.

The chain to produce economic statistics is demanding an effective and efficient use of profiling. To determine the specific needs of this group of internal customers, we organized a workshop

'Customer Arena'. In this workshop the customers, our statistical departments, are in the lead. They discuss their needs for profiling products and services. What are the current products, are customers familiar with them, what do they think of the quality, of improvements etc. The producers, profiling staff, form the public of this arena. Their main concern is to listen to their customers and to ask clarifying questions. The result is a better mutual understanding of these needs.

Main results were: customers are satisfied with the current service, but there is still room for further improvement. Spend time and effort on profiling cases with the largest statistical relevance (next action: to specify what this means), improve the communication on major changes (timeliness, clear procedure, standardized reports) and involve statistical departments when necessary.

Process analysis and improvements

For the analysis of the profiling process, process mining is applied. This technique uses process metadata that is generated by applications: in this case mainly the Dutch SBR-application. With this information the process 'de facto' can be shown. This results in a process model that shows what actually happens and that facilitates in identifying and quantifying process performance and improvements.

The profiling process itself starts after the processing of all other SBR-sources. Automated results for statistical units, attributes and dynamics are available. When the profiler agrees with this information, the SBR will be actualised with it, otherwise the profiler is able to change the data.

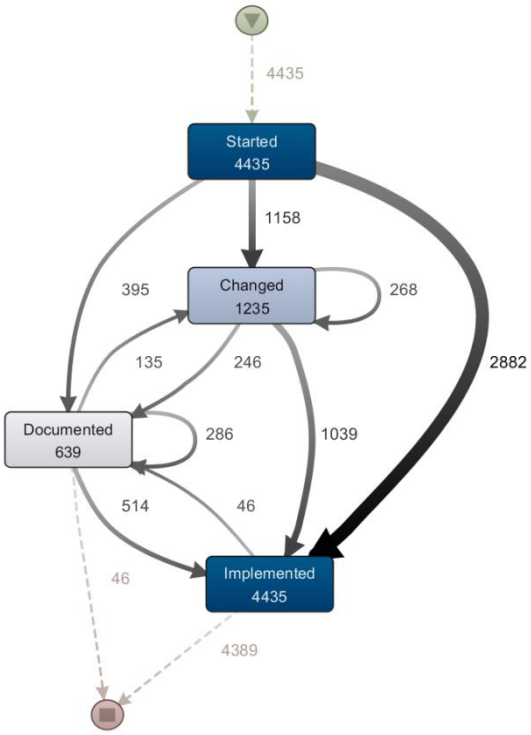
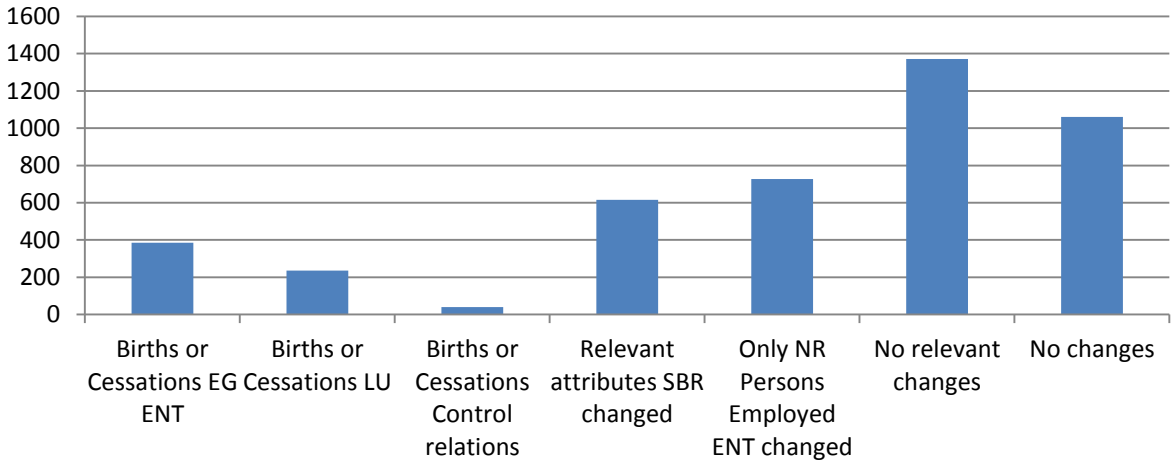


Figure 1. Process for profiling statistical events on Top-P Dutch SBR, Jan-Jun 2016.

This diagram presents the profiling process for statistical events in the first half of 2016. A statistical event is a change or a group of interrelated changes on the Statistical Business Register. All these events apply to the top-P of the Enterprise groups in the Netherlands. The policy is to evaluate all changes on these units by profilers. The diagram shows the number of statistical events on four states of the profiling process and the paths between states. In six months 4435 statistical events were evaluated by profilers. 1235 times SBR information from those events is changed by the profilers (28%). Hence, for 3200 events the information was evaluated to be correct. In 639 cases (14%) 1 or more documents were produced to support/explain the changes in the SBR. The documents are meant to communicate about the new situation with the enterprises and with the statistical departments. 2866 cases (65%) were implemented without changes and without documentation.

Figure 2. Statistical events on Top-P, profiled in Jan-Jun 2016, by type of impact



The analysis of the profiling was elaborated by examining the impact of the statistical events. This indicates the relevance of the process. Figure 2 shows the frequencies of the statistical events by type of impact. Statistical events with births or cessations of entities alter the population of large entities for our business statistics. Generally, they have a large impact on statistics. The same applies for changes on relevant attributes (for example size class, activity, etcetera). The impact of last three types of changes in the diagram is (very) limited. These types of changes with less impact concerns 3147 events (71%)!

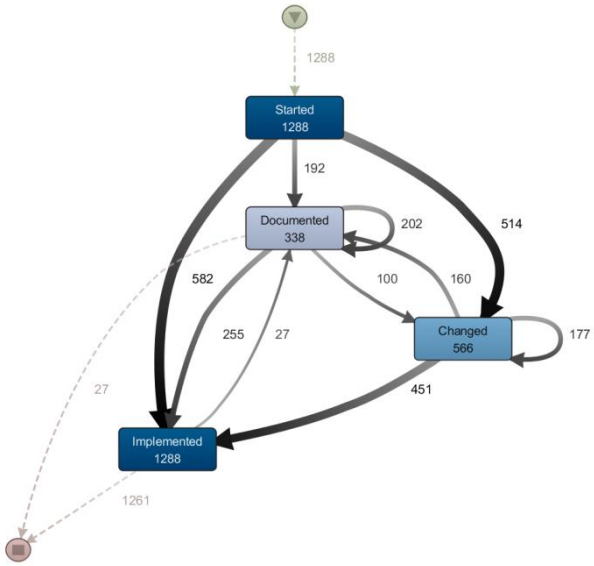


Figure 3. Process for profiling statistical events with statistical impact on Top-P Dutch SBR, Jan-Jun 2016.

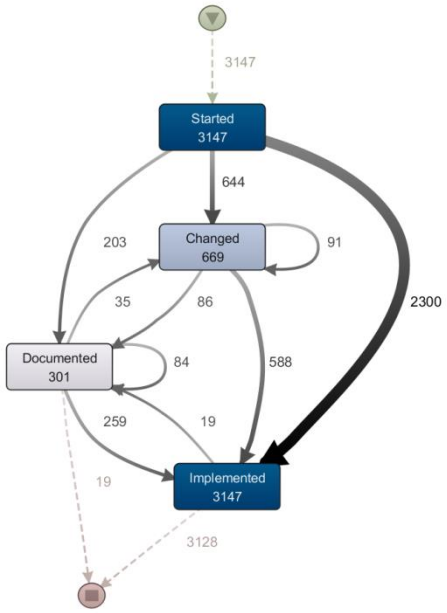


Figure 4. Process for profiling statistical events without statistical impact on Top-P Dutch SBR, Jan-Jun 2016.

The population of statistical events was divided into two groups: events with impact and events without impact. For both groups the profiling process was analysed equivalent to figure 1. Figure 3 indicates that profilers change the SBR in 44% of the events, while 26% is documented. Because of the impact more documentation, or at least more communication, with the statistical departments

would be expected. We found that 45% of the events was profiled without making any changes to the original structure or without documenting. For these events the results from the processing of the Business register before profiling started are accepted.

Figure 4 gives the results of profiling statistical events without a statistical impact. It shows that 10% of the events without a statistical impact are documented, which indicates overprocessing. Further, 21% of those events are changed. The initial impact of these events might have been different and the result of the profiling can be a neutralisation of the impact caused by administrative changes. In 79% of those events the profilers did not make changes. This indicates overproduction.

This analysis shows that a remarkable part of the process can be identified as waste (overprocessing, overproduction) while other parts appear to be under attended. The corresponding effort to execute the profiling process should be rebalanced to get a better compliance with the needs of the users, statistical departments. About 45% (300-350 hours every month) can be gained from the traditional way of profiling and a part of this will be used to improve the service.

Apart from this analysis, the profilers indicated that they spend a lot of time in waiting for applications to start up and close. Profilers use various applications simultaneously (Business register application, a dedicated top-P-application, the Internet, MS-office, Adobe, etc.). Tests and estimations were carried out with the result that 6-8% of profiling capacity is spent on waiting for these purposes. The expectation is that 3-4% can be gained with proper technical improvements.

In order to achieve all these improvements, changes in policy, the register-application, the instructions and, hence, in the profiling process are necessary.

The policy at CBS was to manually evaluate all changes in Top-P enterprises. This Lean Six Sigma project showed that this should be restricted to all changes with a statistical impact. Furthermore the documentation during profiling has to be better aligned with the statistical needs: this requires a decision tree to decide what (and when) types of documentation are useful/necessary and when this is not the case. Three types of documents are relevant: profiling reports to explain the logic applied for the profile, change reports to illustrate the nature of a change and its impact and structure reports to communicate with the enterprises for consolidation and reporting purposes. The readability/usability of the documents has been improved by standardization (templates, created in cooperation with statistical departments).

The application should be able to support the identification of events without statistical relevance and to prevent that these events will be profiled manually.

In the second quarter of 2017 the Dutch SBR-application is changed and from the beginning of July 2017 the new way of profiling was implemented. Early July 2017, the first results of this change became available and they were in line with the expectations: 45% gain in efficiency!.

The costs for this project and for the implementation of the improves will be paid back by the benefits within 4 months.

Conclusions

This project showed that investing in improvements with the use of Lean Six Sigma methods is worthwhile. We managed to improve the efficiency of manual profiling drastically, which creates room to further improve profiling services. By the application of Lean Six Sigma on this process we gained knowledge on the process (especially in the stages Define, Measure and Analyse). We got a better sight with Lean-glasses. Involvement of customers and profilers is necessary to get adequate information and commitment. The availability of sufficient metadata about the process of profiling is very helpful in measuring performance, identifying and quantifying waste and opportunities to improve.

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