A41 Increasing Efficiency in a DNA Unit Using Lean Six Sigma

Joanie B. Wilson, PHD, Jeremy Dubois, BS, Layne Barnum, BS, Erica Sparacino, MS, Myles Robichaux, BS, Alyson E. Saadi, MS, and Melinda Richard, BS, Louisiana State Police Crime Laboratory, 376 East Airport, Baton Rouge, LA 70806; Timothy D. Kupferschmid, MFS, Sorenson Forensics, 2495 Southwest Temple, Salt Lake City, UT 84115; and Glenn Fahrig, MS, and Adam Becnel, MNS, Louisiana State Police Crime Lab, 376 East Airport Road, Baton Rouge, LA 70806*

The goal of the presentation is to show how implementation of Lean Six Sigma can lead to a decrease in backlog and a better working environment for analysts.

This presentation will impact the forensic science community by showing how the use of Lean Six Sigma can dramatically impact the workflow and throughput of forensic cases.

The number of DNA requests received in many public crime laboratories has increased such that backlogs exist and turnaround-times are extended. The Louisiana State Police Crime Laboratory (LSPCL) saw a 22% increase from 2006 to 2007 in the number of DNA requests submitted. The completion rate was not increasing at a rate to compensate for the increased submittals nor could the completion rate eliminate the backlog of requests that had accumulated. Turn-around-times exceeded a calendar year.

The Efficiency Improvement Grant provided the tools needed for LSPCL to change the technical workflow of DNA forensic analysis which allowed the backlog to be greatly reduced, case turn-around-time to be reduced, and productivity increased such that LSPCL can complete 100% of the DNA requests that are received each month. Management of the administrative work within the DNA Unit has also been changed to ensure that the capacity of the laboratory is maintained and no new backlogs are created.

LSPCL hired external consultants and engaged in several projects aimed at solving the current state problems and changing processes to ensure continued success. Through the development of Lean Six Sigma (LSS) methodology, these projects achieved all goals set forth and has led to a culture that is client driven, quality focused, and efficiency minded. LSS is the unique combination of Lean thinking and Six Sigma process improvement to form a thorough and comprehensive approach to quality improvement, process improvement, and the elimination of waste to produce a remarkably efficient and quality driven product. The combination of Lean thinking and Six Sigma variation reduction, when merged together, forms seven guiding principles. The principles are: (1) focus on the customer; (2) identify and understand how the work gets done; (3) manage, improve, and smooth the process flow; (4) remove non-value added steps and waste; (5) manage by fact and reduce variation; (6) involve and equip the people in the process; and, (7) undertake improvement activity in a systematic way. DMAIC is the acronym that describes the seventh principal. It is a systematic improvement framework, and it is the framework that the LSPCL and consulting teams follow to make dramatic efficiency improvements. DMAIC stands for Define, Measure, Analyze, Improve, and Control. During the define phase of this project, a process map of the standard operating procedure was developed in which the twelve major steps of the process and the major functions under each step were identified. Additionally, a Value Stream Map (VSM) was developed that depicted the flow of cases and information through the laboratory. During the measure phase, current processes were measured to establish a baseline performance. Current state of cases and data for concepts such as turnaround time, total queue time (waiting to be worked), total process time, value added time (amount of time spent performing actual tasks), non-value added time, and the number of cases in progress (WIP) were measured. State spaghetti charts were created to graphically illustrate the physical movement of people and evidence throughout the laboratory. Next, the analyze phase focused on analyzing the data collected during the measure phase and investigating the causes of the problems, bottlenecks, backlogs, and defects uncovered during the previous two phases. Daily production meetings were implemented to discuss daily progress and workflow. Construction of a Level Load Chart was developed to help create flow throughout the laboratory. The improve phase involved three distinct segments: (a) generate ideas about possible solutions; (b) select the most appropriate solution; and, (c) plan and test the solution.

Laboratory processes and equipment were relocated to reduce motion waste, and standards of work were implemented. Unnecessary procedural steps were removed and a master hour-by-hour schedule was implemented along with a three week schedule of a proposed casework cycle. Teams of three DNA analysts performing DNA analysis on batches of 8-10 cases in a five day production cycle were created. The final phase, control, enabled the laboratory to put in place a Management System to continually monitor its output and adjust operations when the data indicated or when the customer's requirements changed. Visualization of current process and performance measurements were displayed. Data such as samples processed, cases received and completed, backlog, turnaround time, and status of unassigned priority cases are tracked visually on a daily, weekly, and monthly basis and analyzed for a constant, smooth output. LSS can be applied to any process or any industry. LSPCL used this methodology to enhance the technical scientific process.

As of June 2011, LSPCL has decreased its turnaround time from an average of 291 days in May 2008 to an average of 31 days with 95% of DNA requests completed within 30 days. LSPCL has tripled the productivity from 50 cases per month to 160 cases per month. The backlog has decreased from approximately 1,400 cases in May 2009 to 120. Total

queue time decreased from 181 days in May 2010 to five days. Additionally, the number of samples completed per month has increased from 312 to 979 with an average number of cases completed per analyst per month increasing from 1.9 to 11.5 cases.

LSS methodology gives the user the necessary tools and a process that provides rapid and sustained improvements for technical or administrative processes. LSS was, and continues to be, a powerful management tool in the DNA forensic operations of the LSPCL. With turn-around-times of <30 days, a workflow that allows a DNA forensic request to be completed within 6 days, the capacity to work all cases submitted each month, and a backlog that is eliminated each month, LSS has proven its ability in the forensic laboratory. The methodology allowed LSPCL to meet all project goals and has afforded increased operational efficiency and increased quality and service to the agencies served. The real-time support provided to investigations is helping solve crimes and is thereby making the citizens of Louisiana safer.

Increasing, Laboratory, Efficiency

 ** Presenting Author*