A Framework For Lean System Implementation In Healthcare

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INTRODUCTION

The Vice President - Finance of a mid-sized hospital in North-West America invited me and my project partners to a meeting to address a problem that was nagging him for a while. I was then a newly joined research scholar at a public university with education and training in engineering - and was quite unaware of how hospitals worked. My job was to study the impact of Toyota Production System (TPS) principles and practices to improve hospital work processes. TPS, often called Lean Manufacturing by many, is concerned with waste elimination. Waste, according to lean experts (Womack and Jones, 1996), is any activity that does not add value in the eyes of the customer, and for which the customer is unwilling to pay for. As Shigeo Singo, a Japanese expert on manufacturing practices argued that 80% of the TPS is about eliminating waste from the system (Shingo, 1989). Thus, the entire notion of lean management revolves around eliminating waste from the system. Therefore, the starting point of any improvement effort using lean management principles entails understanding the system in detail and looking for waste and its elimination.

The problem the vice president of the hospital encountered was typical for many business enterprises - high accounts receivable period. The accounts receivable days is defined as the difference in time between the patients arriving at the hospital for service until the time the hospital got paid for the services rendered. The accounts receivable days for the hospital were significantly higher than the industry average. As a consequence, the vice president was deeply perturbed and wanted our services to address it.

Due to paucity of human resources, we decided to reduce the scope of the problem initially. We agreed upon focusing on the high accounts receivables in the emergency department only, with the ultimate intent to propagate our understanding of the problem and its successful resolution to the other areas in the hospital. The accounts receivable days for the ED were 50% higher than the industry average. As organizational processes are usually interlinked, we could not fathom initially where things were going wrong. There were multiple departments - Emergency Department (ED), Hospital Information Management (HIM), Patient Financial Services (PFS) that were sequentially involved in the process of treating emergency patients and creating , coding , and processing the charts for payments from the insurance companies.

CURRENT PROCESS

The process prior to problem solving worked like this. The patient came to the emergency department. After the initial triage, the patient was sent to the doctor. The doctor, after examining the patient, ordered diagnostic tests. The doctor after receiving the diagnostic test reports decided admission or release of the patients. Following the discharge of the patient, the documents were sent to the HIM department by the ED for necessary coding (diagnostic and procedural) to be used for billing purposes by the PFS department. PFS after necessary processing, sent the documents to the payers, i.e., insurance companies, for payment. After reviewing the documents, the payers sent the payment to the hospital after a certain period of time. Often due to delayed submission of charts from the hospital, the payments were held up, leading to high accounts receivables.

As a first step in our problem solving exercise, I formed an interdisciplinary team comprising of senior members from each department -- ED, HIM, and PFS. We jointly observed the total process first-hand, talked to the individuals in each department, and collected relevant documents. We then drew a current state VSM. Womack and Jones (1996) defined value stream as specific actions required to bring a product from raw materials to the ultimate customer. A VSM (Rother and Shook, 2003) is a visual paper and pencil tool to see a process end-to-end, that is, to capture the big picture and understand the value added and non-value added activities involved in manufacturing a product. The

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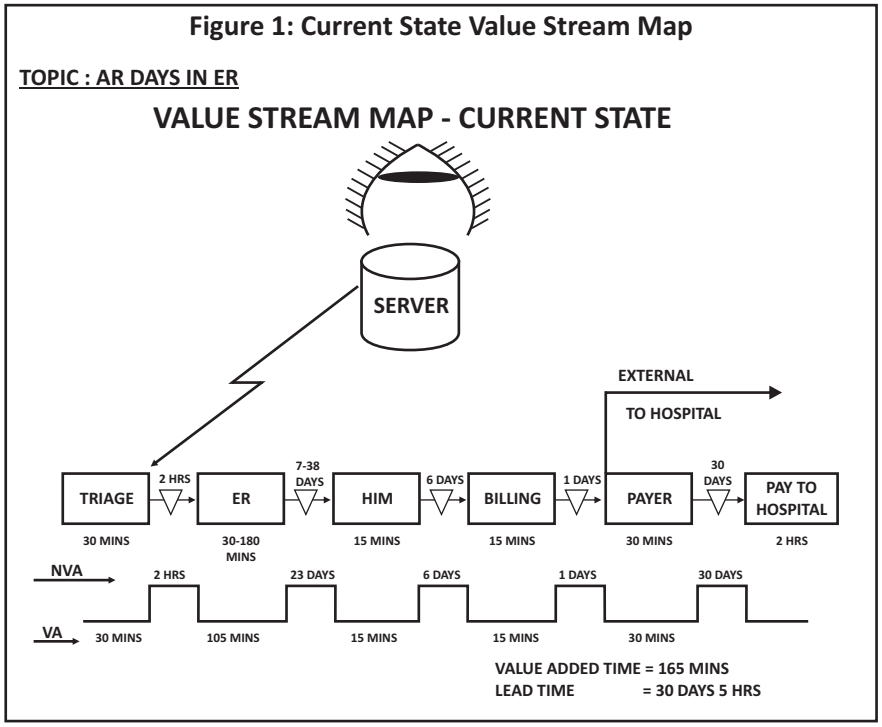
intent behind using such a tool is to eliminate the non-value added activities from the process. Rother and Shook mentioned that Toyota executives developed value stream for material, information, and people. In a typical factory environment, the overall value stream starts with the company receiving the order from the customer to the point the product is delivered and the payment is received from the customer. On the factory floor, the value stream starts from the entry of raw materials into the facility, to the point where the finished product is shipped out of the facility. In the present case, the value stream was defined from the point when the documents were created when the patient arrived at the hospital, until the hospital got paid for the services offered.

The current state VSM clearly exhibited huge delays in sending charts from the ED to the HIM (Figure 1). The value-added time was only 165 minutes. In contrast, the total lead time was more than 30 days - huge variability in task times was also observed. Sometimes, the charts were sent within seven days of seeing the patient, and on other occasions, the charts were sent after thirty eight days. As the charts were sent late to the HIM for coding, the coder's work got delayed. Consequently, the hospital failed to submit the necessary documents to the payer on time, resulting in high accounts receivable days.

Figure 1: Current State Value Stream Map

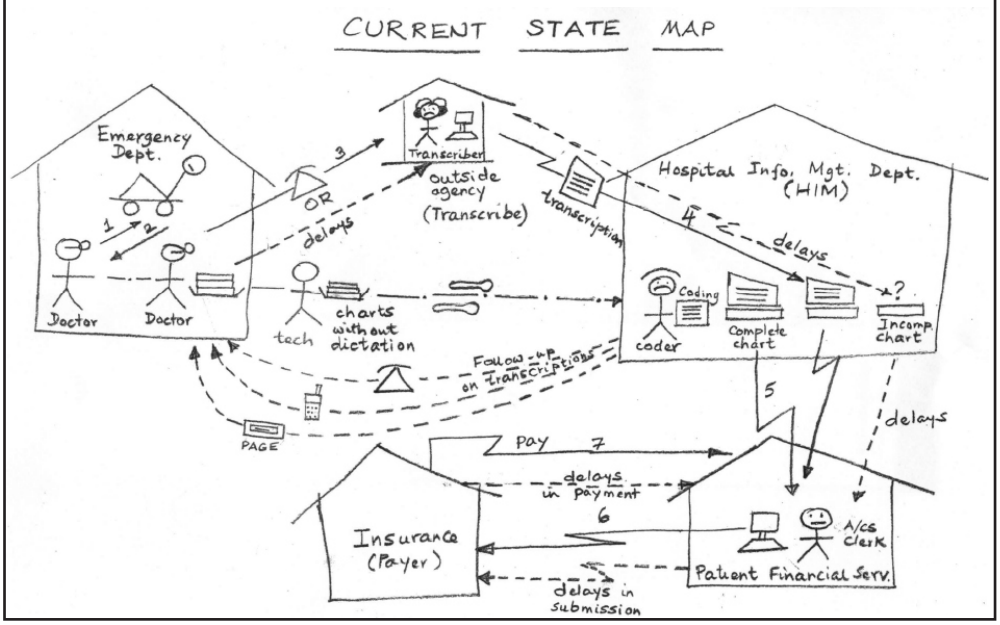


During the study, the team assumed that the payers, i.e., the insurance companies, were external to the hospital, and therefore, the hospital had little control over their operations. So, a decision was made to focus efforts on a specific area in the internal operations of the hospital, i.e. chart flow from ED to HIM.

Since significant delays existed in sending the charts from the ED to the HIM department, this delay ultimately contributed to the overall delay in getting payments from the payer, and the team investigated the reasons for such variability. In order to answer that pertinent question, a second tool called A3 report (Jimmerson, Weber, and Sobek, 2005) was initiated for the study. The A3 report captures the key steps of a methodical problem solving technique on one side of an A3-sized paper, roughly equivalent to an 11×17-inch paper. The systematic procedure is grounded in the Plan-Do-Check-Act (PDCA) cycle, often called the Deming Wheel. The left-hand side of the tool embodies the *"Plan"* of the cycle, and the right-hand side reflects the *"Do", "Check", and "Act"* parts of the cycle. Toyota Motor Corporation uses this tool for its internal problem solving efforts, and is considered to foster meaningful communication among individuals from diverse disciplines.

The team studied the process of preparing a chart in the ED department more closely. The process was studied and is depicted on the A3 report (Figure 2). The arrows along with the associated numbers indicate the order in which each task took place. Usually, the doctor after seeing the patient dictated over dictaphone to an outside agency for

Figure 2: Drawing Of The Current Process



transcribing. The outside agency transcribed and sent the transcription to the HIM and not to the ED, while other documents were sent to the HIM by the ED separately. Therefore, it became critical for the HIM personnel to ensure that they appended the transcription of each patient to the other documents sent earlier by the ED. When the charts included transcription, the coders coded timely and sent them to PFS for billing, who then forwarded the bills to the payer for payment.

Often, the HIM personnel found that all documents, except the transcription existed, without which the HIM coders couldn't code. In fact, we noticed during our observation in HIM, that 39 charts over a 9-day period waited to be coded for transcription. On further investigation, it was revealed that quite often, due to work pressure or for other reasons, some of the doctors were unable to dictate on the day of the service. The problem was further aggravated due to the fact that sometimes, the doctors reported for duty not the next day, but after a few days of seeing the patient as scheduled. As a consequence, many dictations remained pending until the next visit by the doctor. Since the HIM staff received all documents except the transcription, they had to follow up with the ED staff for the missing transcription by various modes - phones, pagers, or mobiles to arrange for the missing transcriptions. The ED staff, in turn, had to request the doctors to expedite the process. Situations were not rare when the staff from the HIM had to follow up with the outsourcing agency as well for the missing transcriptions. The consequences were obvious - long delays in getting the coding done and rework for the HIM personnel. The HIM staff had to keep track of current patient charts, and also the old ones that waited for transcription, and the volume kept on increasing day by day.

REVISED PROCESS

In order to ensure the delivery of the complete charts from the ED to the HIM, the process was redesigned by the team. In the revised process (Figure 3), the outside agency transcribing the dictation was instructed to send the transcription to the ED directly, and not to the HIM anymore. This subtle change in the procedure ensured that the ED staff sent a complete chart, including the transcription, to the HIM for coding. All the necessary hardware arrangements were made in the ED, so that the transcription could be downloaded in the ED itself, and the ED technicians were assigned the responsibility to append the transcription with the right patient chart before delivering the same to the HIM. Clear instructions were given to the staff of the ED that no chart could leave the ED for HIM unless it was 100% complete in all respects, which included the transcription. In addition, the doctors were asked to complete the dictation within 48 hours of the date of the service as well. Alteration in the old procedure had a huge impact on the flow time of the charts through the system.

After several weeks, follow-up data were collected over a period of 11 days to check the efficacy of the new process. It was found that out of 371 charts that were received by the HIM from the ED, only 5 charts didn't contain the transcription. A future state value stream map (VSM) was drawn after the improved process was put in place. Figure 4 depicts the value-added time, non-value added time, and the total lead time of the charts through the system. The flow time of the charts was reduced to 9 days from 30 days.

Figure 3: Drawing Of The Revised Process

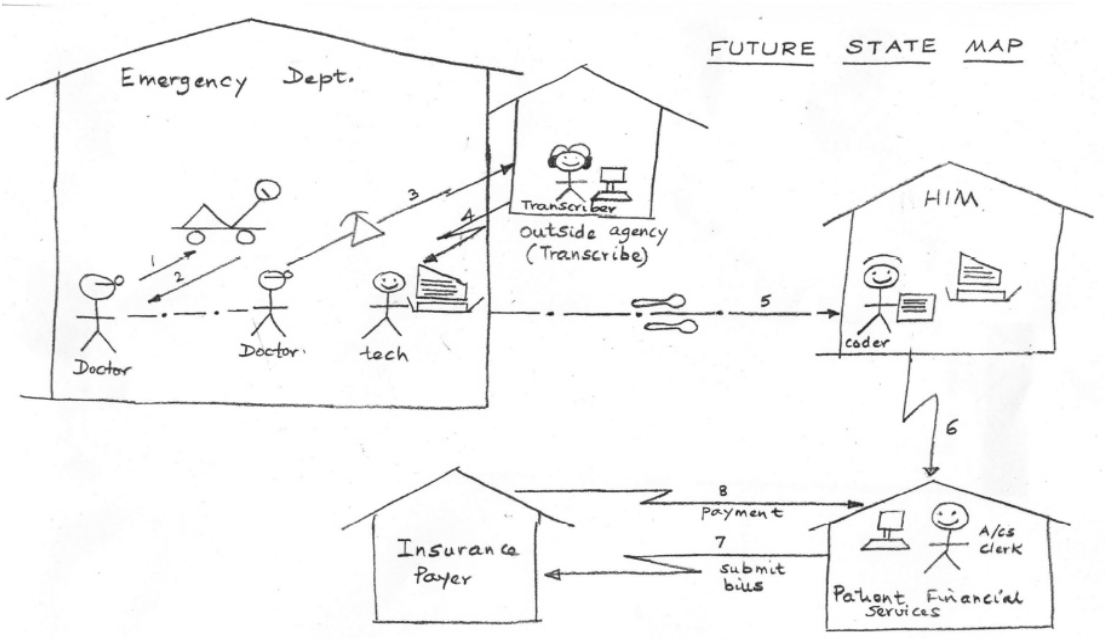
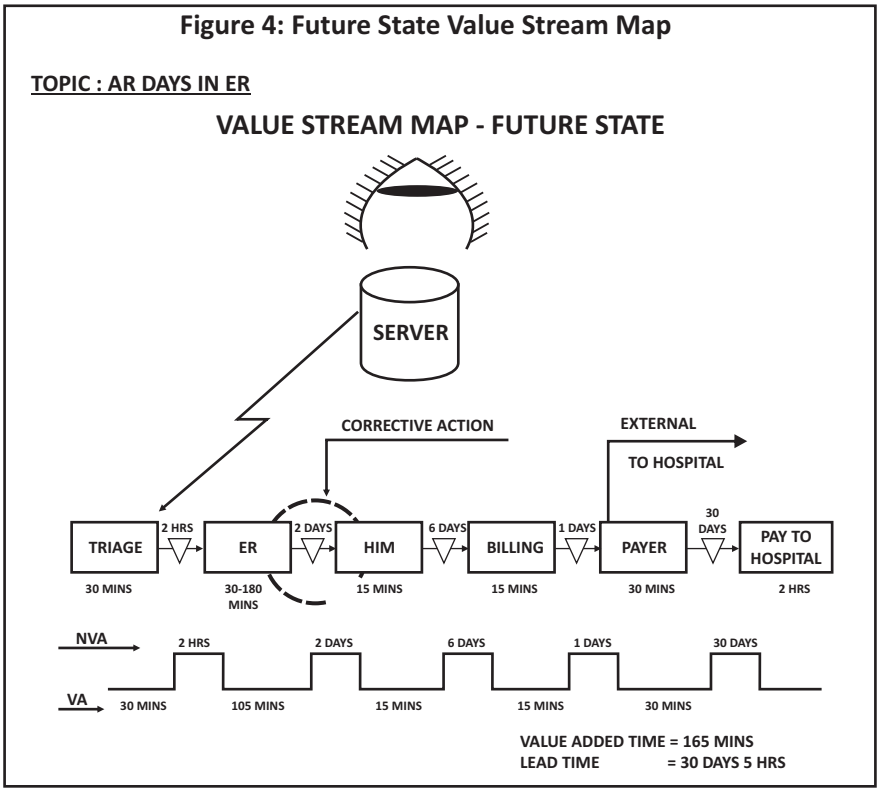


Figure 4: Future State Value Stream Map



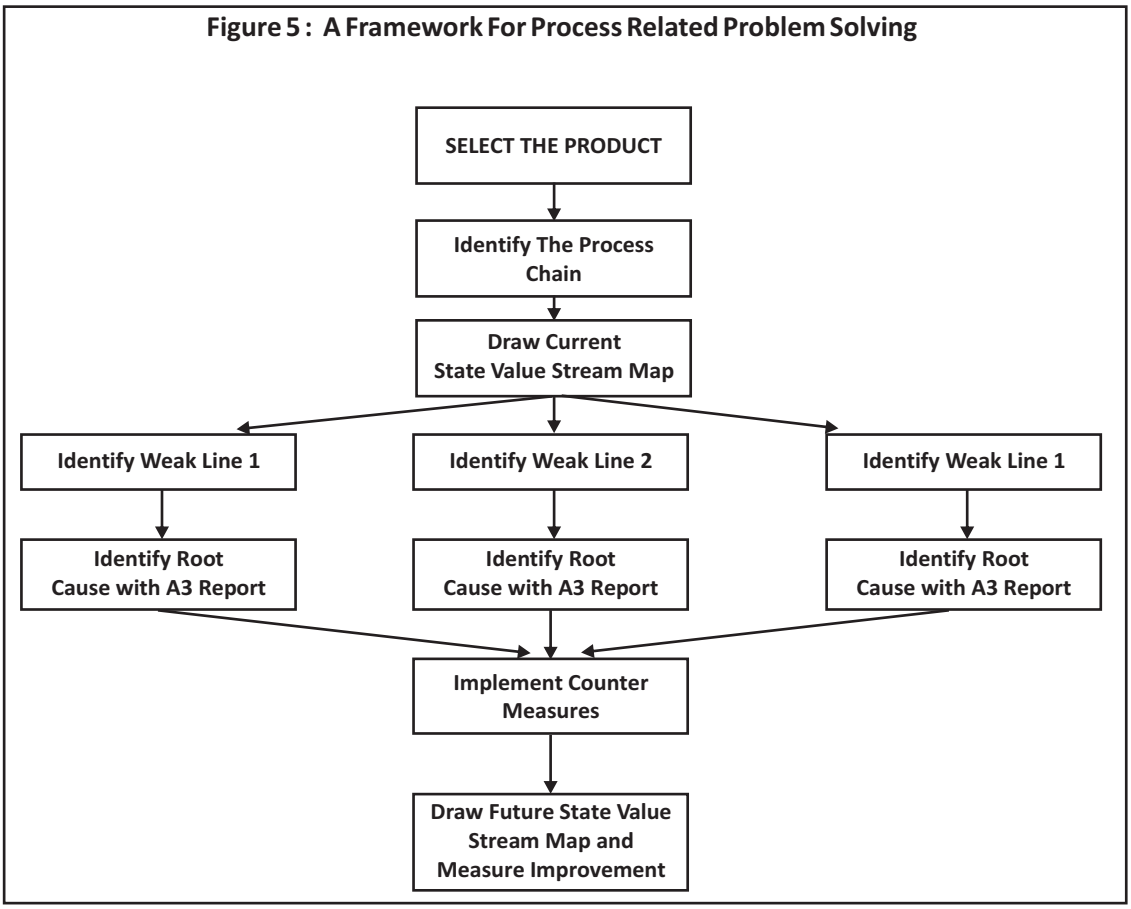
CONCLUSION

Identifying the real source of a problem is often challenging and arduous in an organizational setting, where processes are primarily interlinked. In a majority of the situations, we observe a phenomenon, but fail to understand its underlying causes. Indeed, determining the exact source of the problem and its causes can be quite baffling and insurmountable in large and complex organizations. Paucity of time and inadequacy of human resources often makes the problem solving exercise even more difficult. VSM can be a savior in many such difficult situations. It provides the first step in identifying the weak links in the process chain that need immediate attention. Thereafter, using a systematic problem solving tool like the A3 Report, the real causes of the problem can be ascertained, and the likely actions can be planned to eliminate the non-value added activities or wastes from the system.

When we started working on the problem solving exercise, there were insinuations from other quarters that the bill submission process was delayed at the HIM. However, on closer investigation, it was found that the real cause to the problem lay elsewhere, and not in the HIM. The coding process was sometimes halted due to delayed dictation by the physicians in the ED. Had the HIM staff received the completed charts in the first place, the coding could have proceeded on time, and the charts could have moved through the system to the payer for payment without any hindrance. Indeed, by streamlining the ED chart completion process, we significantly brought down the lead time. Thus, by redesigning the activities in the ED and the HIM, and by inculcating some discipline in daily work practices, the rework and delays in the process were completely eliminated , and the flow of the charts was made unidirectional.

Usually, after tackling the weakest link in the process chain, the focus can be shifted towards the next weakest link, and the problems can be ascertained and resolved using A3 report(s). As a sequel to the study just explained, the focus of the team shifted exclusively to the internal functioning of the ED department to ensure dictation by the physician within 48 hours of the date of service. Similar A3 problem solving exercise was initiated, and the internal functioning was streamlined using another A3 report. In this fashion, we studied multiple weak links in the process chain that

Figure 5 : A Framework For Process Related Problem Solving



contributed to high accounts receivables. Once the links are properly streamlined by eliminating the non-value added activities, flow of information and material in the process chain becomes unidirectional and uninterrupted. The problem solver can then design a future state VSM that entails only value-added activities. Figure 5 demonstrates a plausible framework that could be useful in many process-related problem solving efforts in hospitals desiring to become lean organizations. The framework supports Rother and Shook's (2003) argument that lean improvement efforts are the most appropriate when applied in the context of the lean value stream.

The problem solver could divert his attention to the next process chain requiring attention, and the whole process could be studied similarly using VSM and A3 report(s), as explained earlier. This process could be replicated in many areas of the organization to make it lean.

A point worth noting is that the weak link that we identified was at the intersection of the functional boundaries, that is, between ED and HIM. This seems to suggest that organizational members had inadequate understanding of the process across functions. The members of the ED failed to comprehend how their work impacted the working of the members in the HIM, the downstream department. It seemed nobody owned the process at the boundary. The process thus faltered at the functional boundary of the ED and the HIM. In fact, a majority of the problems that we investigated in the hospital during the period from 2003 to 2006 were primarily at the intersections of the functional boundaries. This finding seems to concur with the findings made by other researchers (Carlile, 2002; 2004; Bechky, 2003). This study, as well as the work done by other researchers, seem to suggest that organizational members need to look more closely at how their internal functions can be integrated seamlessly at the boundaries with the other functional departments. Only then can the organization be lean and run like a well-oiled machine.

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