A3 Reports: Tool for Organizational Transformation

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Abstract

The A3 report is a tool that Toyota Motor Corporation uses in problem-solving. We have adapted the A3 problem-solving report for use by hospital staff to improve their organizational processes, and have successfully applied it to numerous problems within a local hospital. We have previously presented a template for A3 reports. Here we describe the problem-solving process embedded in the tool, illustrated by an example, then discuss reasons for the method's effectiveness when properly implemented, and its potential for wide-spread organizational transformation.

Keywords: Toyota, lean healthcare, process improvement, problem-solving method

1. Introduction

Nowhere is efficiency improvement needed more in our society than the health care system. Error rates are shockingly high [1]. Health care costs in the U.S. are growing at rates that exceed inflation or wage rates [2]. The industry is experiencing significant labor shortages in many areas even while it faces dramatic increases in demand as the baby boomer generation ages [3]. In response, many health care organizations have launched Continuous Quality Improvement (CQI) initiatives, health care's equivalent of total quality management, while health care administrators become increasingly conscious of costs, waste, and inefficiency [4]. And even though evidence of continuous improvement is a high priority for health care accreditation agencies, these efforts seem to have done little to reverse or even dampen the trends. A new approach is needed.

Toyota Motor Corporation is perhaps best known for its highly effective production system, discovered by Western researchers in the 1980's and labeled "lean manufacturing" by an MIT study [5]. Toyota also excels at continuous improvement on a corporate-wide basis like no other. While the tools and principles of lean manufacturing are well-documented (e.g., [6]), how Toyota deploys its continuous improvement system is less well understood. Recent scholarship, however, has shed some light on this subject [7-9]. From this work and the first author's own research on Toyota [10], we have distilled salient characteristics of Toyota's approach to continuous improvement into a general tool and method for process improvement suitable for health care environments, and have applied the tool and method to numerous processes across multiple hospitals with success. Our approach has been to train health care workers in the tool and method, then coach them through a problem-solving effort on a live problem in their work area. In other words, the workers do the problem-solving, not us. And the response has been very positive.

In prior work, we describe the general tool (an adaptation of a tool developed at Toyota) along with its application to an actual health care process improvement problem [11]. In this paper, we outline the problem-solving method used in conjunction with the tool and present theoretical basis for why this problem-solving method is effective, so effective, in fact, that they can become the impetus for organization-wide transformation. In the next sections, we briefly describe the tool and the problem-solving method, followed by an example. We then discuss their effectiveness in solving local problems, and their potential to facilitate wide-spread organizational transformation.

2. The A3 Problem-Solving Report

The A3 report is so named because it is written on an A3 sized paper (metric equivalent of 11" x 17"). Toyota has developed several kinds of A3 reports for different applications, though we have focused on adapting the problem-solving report because of its suitability for health care environments. Briefly, the template establishes a basic outline that guides the user to successful resolution of a problem experienced in the course of daily work life while documenting the key stages of problem-solving. The template outline is as follows:

1. Issue statement: a descriptive title for the report.
2. Background to the problem: relevant information to connect the issue with the broader organizational and historical context.
3. Current Condition: an iconic diagram that describes how the process currently works, with the main problem(s) labeled and data describing the extent of the problem (e.g., percent of orders received late).
4. Cause Analysis: chain of cause-and-effects leading to the root of the problem.
5. Target Condition: proposed countermeasure(s) to the root cause(s), an iconic diagram that describes how the new process will work with the proposed countermeasure(s) implemented, and predicted performance.
6. Implementation plan: the actions required to realize the target condition, who will take each action, and when.
7. Follow-up plan: how and when the user will verify that the target condition was realized and that the predicted results were achieved.
8. Results: the actual results of implementation (left blank initially).

On the 11" x 17" sheet of paper, items 1-4 flow from top to bottom on the left-hand side, and items 5-8 flow top to bottom on the right-hand side. For more detailed information, see [11].

3. Using A3 Reports for Organizational Change

We have found the A3 problem-solving report to be a powerful tool for process improvement. It also has the potential to greatly increase the rate of organizational learning, and become a catalyst for transformation into a truly continuously improving organization. To do this, the A3 problem-solving report must be implemented in such a way as to maximize learning and cooperation within the organization. We have attempted to emulate these characteristics in a problem-solving method that is consistent with process improvement procedures used in practice at Toyota. The steps of the A3 problem-solving process are outlined in the subsections below.

3.1. Identify the Problem

The first step, of course, is to identify a problem to work on. It is perhaps most advisable to have the persons closest to the work identify and work on problems that arise in the normal course of daily work. While management could certainly direct the organization to work on particular issues, they tend to identify problems that are large in scope, with many subproblems intertwined, numerous nuances and conflicting considerations, and affecting a large number of people. In other words, they want to bite off too much. Front-line workers and supervisors, on the other hand, tend to see problems with much smaller scopes, that are more concrete and manageable, and that can be tackled on short time frames (e.g., on the order of days and weeks rather than months or years) with little or no capital investment. Having all members of the organization solving problems frequently, even if they are small problems, can have a dramatic cumulative effect. Addressing the apparently small problems can resolve the apparent "big" problems. So, an individual in the organization identifies a problem that frequently makes his/her job unnecessarily difficult or burdensome, or that results in an undesirable outcome.

3.2. Study the Current Condition

A deeply engrained principle at Toyota is to "go and see for yourself" [7]. In practice, this involves observing the process first-hand, gathering data, and interviewing those affected. For example, one hospital unit was having a problem with transcriptions of a particular procedure, so the nurse physically walked to the transcription department and observed the transcription procedures first-hand and soon discovered that the transcriptionists were misinformed as to which "shell" in which to save their transcriptions. Without the direct observation, the cause of the problem may not have been uncovered so quickly. The observations and other data gathered are synthesized and documented in the Current Condition section of the A3 report.

3.3. Identify the Root Cause

The apparent direct cause of a problem is rarely the root cause. If root causes are not addressed, problem recurrence is highly probable. For example, the direct cause for poor performance on an exam may be "did not study enough," but the root cause may be poor time management or misplaced priorities. Without addressing the root cause, poor exam performance is likely to repeat. The most popular, and effective, method for discovering the root cause is the "5 Why's" method championed by Taiichi Ohno, the inventor of Toyota's famed production system [12]. The problem-solver asks "Why?" at least 5 times in series until arriving at the root of the problem. The resulting chain of cause-and-effect is documented on the A3 report.

3.4. Confirm Understanding of the Current Condition

Once the problem-solver feels s/he has a good grasp of the current situation, s/he then presents the current condition and cause analysis to representatives of all affected parties and requests feedback. This is best done in face-to-face meetings, ideally in the affected work area(s) so that all can view the system immediately in relation to the documented process. The purposes of this step are to: make sure all angles are covered, obtain as accurate a picture of the current situation as possible, solicit improvement suggestions, and start building the organizational buy-in that will be crucial for successful implementation. The draft A3 report in-progress serves as the focal point of discussion, and is revised as appropriate.

3.5. Envision the Future State

With all the background research as a foundation, the problem-solver then brainstorms possible countermeasures to the root causes identified, then creates a diagram of how the new system will work with the most promising countermeasures in place. Ideally, the target condition will conform to the basic work design principles, such as the rules-in-use regarding activities, pathways, and connections advocated by Spear and Bowen [9]. Based on the user's understanding of the work systems, s/he predicts the improvement in performance expected by the proposed changes. The future state is documented on the A3 report.

3.6. Create implementation and follow-up plans

The actions required to create the countermeasures, put them in place, and educate/train appropriate personnel are then planned. Specifically, the problem-solver identifies the specific actions, who will do them, and by what date. Next, the problem-solver creates a plan to verify, after implementation, whether the countermeasures achieved the predicted results; that is, what follow-up actions will be taken when. Follow-up is a crucially important step in any continuous improvement program. The target state essentially states a hypothesis, but the user's learning is not verified until s/he confirms or refutes the hypothesis. For example, if the desired results were not achieved, was it because we didn't understand something about the current condition, or because the implementation plan was not executed? Further, follow-up provides accountability to the system, and often leads to the next problem to be tackled, kick starting another process improvement cycle. The implementation and follow-up plans are documented in the appropriate sections of the A3 report.

3.7. Create Consensus

As with the background / observation work, the problem-solver cannot work in a vacuum if s/he hopes to successfully achieve improvements. So, the A3 report author meets with key representatives of all affected parties (especially individuals identified on the implementation plan!), presents the proposed target condition and implementation and follow-up plans, and requests feedback. Revisions may be necessary, and previous steps repeated until all the key players are agreeable.

3.8. Obtain Approval

The problem-solver's job is not complete until the proposed change and implementation plan receive approval from the appropriate authority (e.g., departmental manager). The manager's job is to ensure that the A3 report author has rigorously followed the prescribed process: current condition was created through observation and represents actual rather than espoused work processes, the target condition moves the organization closer to ideal, all the affected parties have been involved in the process and are agreeable, a follow-up plan is in place, and so forth.

3.9. Implement

Once the A3 report is approved, implementation proceeds as planned. Up to this point, the process has dealt with the "plan" step of the PDCA (plan-do-check-act) cycle. Without execution, the "do" step of PDCA, all the previous work is for naught.

3.10. Follow-up

The last step in the cycle is to follow-up the implementation (i.e., "check" of PDCA). Did the new process achieve the expected results? Often, the answer will be "not exactly." This represents a new problem to be tackled, or "acted" upon.

4. Case Example

We have used the A3 tool on dozens of problems in a number of health care organizations [13]. To illustrate the A3 problem-solving process described in the previous section, we present a case example from an intensive care unit (ICU). Registered nurses (RN's) on this unit discovered several instances where the actual intravenous (IV) medication infusion rate differed from the prescribed rate. In fact, in one instance the patient was being medicated at twice the prescribed rate. Though no untoward incident occurred, there was a potential risk of harming the patient. The manager requested an experienced nurse to investigate the problem using the A3 process.

To understand the problem first hand, the nurse and two others observed on-duty ICU nurses perform the procedure of calculating and setting the IV infusion rates for about one hour each. In comparing notes, they discovered that every nurse followed the same process steps, but that they used four different methods to calculate the drip rate: manually on paper, manually using hand-held calculators, mentally, and using the software embedded in the computerized IV monitor in each patient room. Further, it was found that nurses frequently failed to double-check drip rates at the beginning and end of shifts as required by policy. To estimate the magnitude of the problem, the nurse inspected ICU records for the preceding three months and found seven documented cases of incorrect infusion rates. The nurse depicted the observed process, including the four different rate computation methods, in the current condition section of an A3 report.

The subsequent root cause analysis identified three causes to the problem. First, inconsistency in the methods of calculating the drip rate resulted from differences in on-the-job training and education for the RN's, and from lack of a specified procedure to calculate drip rate. Second, nurses often could not use the IV monitor in calculating infusion rates because of inconsistency in the medication-related information inputted into the monitor. This was again due to lack of protocol and training. Third, the RN's failed to double check the infusion rate at the change of shift because it was not part of the nursing documentation and not specified as part of their daily work flow.

From the root cause analysis, the countermeasures were fairly straightforward: establish one uniform method (using the IV monitor) to calculate IV medication drip rate, update and standardize information in each monitor, create a method to double check rates at the end of shifts, develop a competency packet for training of all RNs, and create a clear signal for documentation completion. This last item was implemented by applying a stamp to each patient's medical chart upon admittance to prompt and standardize documentation of the medication, dosage, patient weight, and infusion rate. The work flow involving these proposed changes was depicted in the future state section of the A3 report. The nurse then discussed the proposed changes with the ICU manager and charge nurses of the unit, all of whom agreed to the changes.

From there, an implementation plan was created that included the necessary steps to realize the changes, including RN education and training. A follow-up plan was also established. This was presented to the ICU manager who shared with the RN's at a staff meeting and approved the proposal. Implementation proceeded immediately thereafter. The nurse monitored ICU exception reports for the three months following implementation, and found no cases of incorrect IV infusion rates, providing strong evidence that the countermeasures were effective in addressing the problem.

5. Why It Works

In a separate analysis of 18 cases involving applications of the A3 process, we found that participants who followed each step consistently achieved excellent results; and further, we found that skipping even one step dramatically reduced the likelihood of success [14]. The reason, we believe, is that for organizations to improve and transform, both cognitive and behavioral changes are required, and each step in the process contains an essential ingredient to precipitate those changes.

The first ingredient is to objectively challenge the current level of understanding. In the case above, the nurse leading the change did this through direct observation and by discussing those observations with other nurses. The

challenge will either confirm current understanding or create new learning. In the IV infusion case, it was both: they confirmed their understanding of the steps executed in the actual course of work, but learned that they did not fully understand how the workers performed an important step (infusion rate calculation). Had the nurses convened in a conference room and drawn a flow chart of the process from memory, they would not have challenged their understanding and may have missed the critical insight that lead to effective problem resolution. From there, it becomes critically important to validate the new learning through small scale experiments and follow-up. If the new insight was correct, then one should be able to predict how a specific change in the work (as in using a consistent method for calculating infusion rates) will affect performance (e.g., incorrect infusion rates will drop to zero). If the actual change in performance is different than predicted, then something is amiss in one's understanding of the current condition and the learning cycle begins anew. Our research suggests that verifying (i.e., challenging) the new learning using objective data and tools is critically important to sustained process improvement.

A second ingredient is to address the root causes of problems, not just the symptoms. For example, had the problem solver in the case example decided that nurses not using the IV monitor software was "the problem," rather than nurse training and work procedures related to the input of patient information into the software program, the imposed solution would likely have been meager and ineffective at best, and possibly even make things worse (i.e., forcing nurses to use the software where garbage in would mean garbage out). As it was, the root of the problem was addressed, and the problem effectively resolved; plus, the problem is less likely to recur if the department experiences turnover among the RN's because of the new training system in place.

Thirdly, the proposed changes should be evaluated from a systems perspective. The primary steps in the A3 method for ensuring this are the discussions with affected parties where the proposed changes are scrutinized from multiple perspectives. These discussions are even more critical for problems that cross departmental boundaries where proposed changes must not improve the situation for one department at the expense of another. In the case above, the lead problem-solver interfaced with the ICU manager and charge nurses at preliminary stages, and with the entire staff just prior to implementation. Since she was a trained nurse, and the problem was internal to the department, no major changes to the initial proposal were made; however, we have seen a number of cases where these discussions resulted in significant modifications. This approach also creates consensus and buy-in from the individuals who will be asked to work differently in the future.

Finally, the problem-solving system requires some level of accountability—who will do what when to make the changes happen. By putting an implementation plan in writing, with names and deadlines assigned, and by having approved by the appropriate authority, it becomes more likely that things will get done. Without it, a decision might be made, but no one is assigned to do it so no one does. An explicit plan for follow-up (again with names and dates) provides an additional measure of accountability.

6. Implementation Issues

While the A3 report can be a powerful tool for promoting fast and effective process improvement, it is not a magic wand. Implementing the tool requires conscious effort, and numerous obstacles must be overcome. Perhaps the most common issue we've encountered is simply making the time to do the problem solving. Health care employees are typically very busy on the job. They do not have an extra couple of hours per week immediately available to devote to process improvement. So getting them to put aside the urgent in order to conduct observations, think substantively about the problem and possible countermeasures, build consensus, etc., is difficult at best. One possible countermeasure to this problem is to provide extra support temporarily in order to get the A3 process initiated. As problems are addressed and processes are streamlined, time spent on wasteful activities is freed up for problem solving. The extra support can then be diverted to another organizational unit.

A second issue is management support. We have found upper management to be generally supportive of the idea in word, but they can be slow to follow it up in deed. Certainly the verbal support is necessary, but it is insufficient. For the problem-solving to continue substantively and on an organization-wide basis requires active management support. Upper management can do this by: learning the A3 process themselves, providing incentives and recognition for A3 problem-solving, making A3 reports part of the employee evaluation system, establishing a deployment strategy and plan and providing sufficient resource, and getting out on the floor and seeing implementations first-hand. This is a high level of dedication, but we have found that low dedication results in sporadic use of the tool and little improvement in overall organizational effectiveness.

Establishing a coaching network is another challenge. We have found that the quality of A3 reports and the learning rate increase significantly when a more experienced problem-solver coaches the process. This suggests that a network of coaches is instrumental in any organization-wide deployment. Yet getting these individuals identified and trained can be a difficult hurdle. One responsibility of a coach is to make sure that problem-solvers do not short-circuit the A3 process. There seems to be a fairly strong temptation to skip steps in the process (probably because it's hard work!), particularly not doing observation to establish the current condition, and not soliciting input and buy-in from affected parties. We've even had people listed by name in the implementation plan, who are not made aware that their participation is requested! Short-circuiting the A3 process renders it ineffective, so it's important that deviations from the basic process be avoided.

7. Conclusions

The A3 problem-solving report, adapted from Toyota, is a potentially useful tool for organization-wide continuous improvement. It simultaneously documents the key results of problem-solving efforts in a concise manner and embodies a thorough problem-solving methodology that begins with a deep understanding of the way the work is currently done. When implemented properly, the approach pushes the organization toward system-wide rather than local optimization as the problem-solver seeks input and ultimately consensus from all parties affected by the proposed change. In taking as many system issues into consideration as possible, the problem-solver attempts to propose countermeasures that help the organization move one step closer toward ideal.

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