A3 Problem Solving

Reference: http://leanhealthcarewest.com/Page/A3-Problem-Solving

A breath of fresh air for ailing healthcare

Since the year 2000 we have applied in research and in practical experience with healthcare providers, principles and methods from the Toyota Production System (TPS). We have been rewarded with positive results in our efforts to reduce waste and errors in our industry and improve worker appreciation of healthcare careers.

The A3 Problem Solving Method and Document (A3) in combination with the Value Stream Map (VSM), both borrowed from the Toyota Motor Company and adapted to manufacturing in the US and elsewhere, has now been demonstrated to be of value in healthcare in every department that wishes to reduce waste and errors and retain good employees.

Bolded below are specific features unique to the A3 process and A3 thinking.

A3 problem solving classes

This problem solving method is so intuitive and effective that we use it as a backbone for our 15 week reVIEW class and our 4 day Green Belt Certification courses. For more information click on the logos below.

The objective nature of the A3 creates safe and acceptable problem solving; it is never critical of an individual's work.

The VSM gives the user a "10,000 foot level" view of the steps in a process as they currently occur from the point of request to the point of delivery of that request. Data collected in each of the steps or "process boxes" shows statistically (thus, objectively) where there is variation in each step and indicates *where* we should observe the activities within that step to recognize opportunities to remove barriers around which the worker must work to produce the step. It is these "work-arounds" and "rework" that we attempt to remove with the A3 process, to ultimately contribute to improving the Value Stream.

The A3 is a way to look with "new eyes" at a specific problem identified by direct observation or experience. It offers a structure that begins by always defining the Issue through the eyes of the customer. In itself this way of stating the problem makes resolution of the problem indisputable.

After all, why are we all here if not to produce an Ideal service or product for the customer or patient?

Objectivity is further reinforced by deeply understanding the current condition before jumping to a solution. When we observe and draw the current condition, we realize that this is the way the current process works; not assign blame to anyone but to acknowledge that this is the way the work happens now, with or without flaws. Once that first view of the problem is made, we can move on to ask ourselves, "What about the way this work is happening is not Ideal?". There is so much power in deeply understanding the way the work is currently being done, and we have historically not taken the time to observe and understand this essential information before creating a fix. In this alone, there is a tremendous opportunity to look at work differently and really see the opportunities for improvement. Even the very popular PDSA (or PDCA) process, which resembles the right side of the A3, does not begin with deeply understanding the current condition. The A3 *first* creates a new way to look at work.

The graphic nature of the A3 contributes to deep understanding of the current condition and the target condition.

With the simple graphic representation of a system problem in the current condition drawing, the problem solver is able to see redundant work quickly and clearly and share the realization with whomever he/she involves in the resolution of the issue. Simple stick figure drawings and lines and arrows demonstrate loops in work that create *work-arounds* and *re-work*. By drawing storm clouds on the graphic it is clear *where* the problems reside in the current condition. Also, because A3s, and in particular the drawings, are done in pencil, it is safe for a problem solver to take the drawing to other affected workers or departments and say, "Here is my understanding of how this work happens now…did I get it right, are there steps I may have left out?". This offers all of the involved problem solvers the chance to erase, redraw and correct any wrong assumptions that may have been made about the work. Because everyone knows how to use a pencil and it can be done immediately, problem-solving progress is rapid and accurate, and the affected workers are able to participate in creating the essential understanding.

Root cause analysis is not new to problem solving, but the A3 offers a simple and consistent way to achieve and document it.

Toyota's *"5 Why's?"* approach to getting to the root cause of the problems identified as storm clouds is easy to remember and easy to execute. When the final *Why?* reveals the root cause, we have concluded what must be addressed to remove the storm cloud and move the process closer to Ideal. The final *Why?* in the analysis of each storm cloud/problem creates a checklist for what we need to do later in the Implementation Plan.

Creating the Target Condition is easy because we so deeply understand what's wrong with the Current Condition.

The right side of the page is the creative and fun half of the A3 because we enter it with such a deep understanding of the current work that a better way to work comes easily. It is also drawn in pencil and we should see the simpler, cleaner process appear on paper, with fewer or no loops of *rework* or *work-arounds*. Because we have done the work on the first half of the A3, we can compare the target condition to the current condition and ask the essential question, "Does this new proposed way to work move us closer to Ideal?". If the answer is yes, then we can move

forward to clearly defining Countermeasures, or changes that we need to make in the process to move from the current to the target condition.

Building accountability with a specific Implementation Plan occurs naturally as we outline the specifics of what needs to be done to make the countermeasures a reality.

By defining *what needs to happen*, *by whom,by when* and with what *expected outcome*, we very clearly and realistically specify the work for the problem solvers involved. This is our work list; this is how the author or the team of the A3 can check progress. Again, it specifies the work and everyone involved knows exactly what's expected of him/her. We can refer back to the root causes identified on the left side of the page and ask ourselves, "Have we removed the causes that are keeping us from achieving the target condition?"

The Test allows us to try out the proposed better way to work with a safe, experimental attitude and environment.

Simulating the situation or creating a test environment to challenge and experience the proposed way to work, with a defined test timeline, makes it safe for problem-solvers to be creative and to experiment. Because of the deep understanding of the process that has been achieved on the left side of the page, the risk is minimal, but the ability to tweak the system before implementation is built in. Once the test is done and the authorization to implement is granted, full initiation of the newly designed work can occur. The responsibility for *Follow-up* to assess the new process over time is assigned to one or more individuals with specific dates for re-evaluation noted on the A3. The follow-up report becomes the new current condition. If it's not perfect, that's OK! We initiate another A3 and ask again, "What about our new current condition isn't Ideal?", hence generating ongoing adaptation to the inevitable changes in our work. This again demonstrates the "safety" of the A3 process; an A3 would be deemed successful if the efforts moved us closer to Ideal, even if there was yet more opportunity to improve that we could continue to achieve. No one is chastised for not making it perfect on the first round.

OTHER VALUABLE FEATURES OF THE A3:

There is tremendous power in having one problem solving method in which management and staff members develop confidence.

When staff and management have been involved with the A3 process and an issue arises for which the A3 approach is suggested, everyone knows the steps that will be employed, believes that they will be either involved or represented in the work redesign and that there will be a timeline and accountability for completion developed. They believe that the experimental environment will be safe. They know that when problem solving is reported, it will be easy to understand and consistent. When management says, "I think we should do an A3 on this", everyone knows what that means.

The A3 is done on the front side only of an 11x17" (thus the name, A3) sheet of paper.

With only a small area for problem analysis, the A3 forces the problem solver to choose issues that are specific enough to complete on one sheet. This assures that the work is of a scope that can be realistically completed, quickly demonstrating successful change and motivating workers to do even more problem solving.

A3 problem solving occurs in the course of work.

Large numbers of staff do not have to be gathered for extended times to do speculative problem solving. Coaches can be recognized and easily trained to help staff validate and participate in the A3 process without leaving their work site.

A3 problem solving is intuitive and easy to learn and remember.

Healthcare workers did not enter the profession to become management engineers or spend all their time improving processes; they came to this work to take care of people. The A3 process is logical thinking based on the familiar scientific method of problem solving that is easy to learn and teach and requires no technical training.

A3 Thinking can be used to create better and fewer meetings.

Conducting a lean meeting using the A3 process can greatly reduce the time and numbers of meetings required to achieve the work of the agenda. A3's are ideally done by a focus group of 2-3 people who represent the affected parties and can procure validation of the current condition and the target condition from their peers, in the course of work.

Measurement of the cost of implementation and the cost benefit is documented on each A3.

The cost of the implementation plan is documented on every A3 and can then be compared to the benefit, which may be measured in hard or soft dollars saved, or in a measure of quality of service. This information creates objective information for leadership to use in authorizing the implementation plan presented on the A3 document.

The A3 form is both a template for problem solving and documentation of the efforts.

When the A3 document is stored in a 3-ring binder on the work unit and logged on the Improvement Marquee ©, real activities can be reviewed by regulatory groups (JCAHO, etc.), governing board members, physicians and senior leaders, as well as staff from other departments. This allows cross departmental sharing of process changes and generates even more problem solving ideas.

Last, but certainly not least, the A3 process is satisfying to everyone who uses it, particularly frontline workers.

The A3 is an easy to learn and easy to teach method that staff can use to remove the frustrations of their daily work that are created by weak and un-supportive processes. This ability to be involved with creating a better way to work has been exceptionally well received by frontline workers, who Toyota recognizes as the resident experts in any industry. It involves them in improving work that is meaningful to them, at a level at which they can see and appreciate the changes they have participated in creating. In this era of current and impending healthcare worker shortage, this satisfaction is essential to retaining good workers.

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A3 Reports:

Tool for Process Improvement and Organizational Transformation

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Abstract

The A3 report is a tool that Toyota Motor Corporation uses to propose solutions to problems, give status reports on ongoing projects, and report results of information gathering activity. In our current research to apply Toyota Production System principles in a hospital setting, 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 community hospital. This paper presents an A3 report template, describes the problem-solving approach it represents followed by an example, and discusses implementation, deployment issues, and potential benefits.

1. Introduction

Few companies in the world excel at continuous improvement on a corporate-wide basis like Toyota Motor Corporation. Toyota is perhaps best known for its highly effective production system, dubbed lean manufacturing by an MIT study in the 1980's [1]. But interestingly, history's most efficient method of production was not born from a sudden brainstorm by an ingenious individual (although Toyota has had plenty of those over the years). Rather, it evolved into its present state over decades of sustained, high level of continuous improvement activity [2]. Toyota's efficiency extends not only to the production floor, but to product development, prototyping, testing, and all other business operations. Manufacturers the world over have been emulating Toyota's practices, and have done so with much success [3]. However, unlike Toyota, much of the success has been confined to the production floor, and little success elsewhere.

Nowhere is efficiency improvement needed more in our society than the healthcare system. healthcare costs in the U.S. are growing at rates that far exceed inflation or wage rates [4]. The industry is experiencing significant shortages in many areas even while it faces dramatic increases in demand as the baby boomer generation ages [5]. Error rates are shockingly high [6]. As a consequence, many have claimed that we are in a healthcare crisis.

The healthcare industry is not standing by idle [7]. Continuous quality improvement (CQI), healthcare's equivalent of total quality management, is pervasive and quality management departments are ubiquitous. healthcare administrators are very conscious of costs, waste, and inefficiency, and evidence of continuous improvement is high in the priorities of healthcare accreditation agencies. Yet it seems all of this has done little to stem the tide. Could Toyota's production system, if applied to healthcare, be more efficacious than other efforts? At first brush, it would seem highly likely that a direct application of TPS tools (like kanban, poka yoke concepts, etc.) would not be very successful because the environments of high volume manufacturing and hospitals are quite different. But careful consideration of the principles and why they work, then adapting the appropriate tools to a hospital environment may result in significant breakthroughs in operational efficiency as well as improving the quality of care. This is the aim of an ongoing partnership between Montana State University in Bozeman, MT and Community Medical Center of Missoula, MT.

Many of Toyota's tools and practices have been studied, written about, and copied, but our efforts have focused on a tool that has received little attention. In prior work researching Toyota's product development system, the first author found this tool to be used pervasively and with incredible power and effectiveness [8]. Toyota uses it to systematically guide problem-solvers through a rigorous process, document the key outcomes of that process, and propose improvements. The tool is used so relentlessly that it forms a keystone in Toyota's world-famous continuous improvement program. Toyota calls this tool the A3 problem-solving report.

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. We have adapted the problem-solving report for use by healthcare workers, most of whom do not have engineering or business backgrounds. A template for our version of the A3 problem-solving report can be found as an appendix to this paper. The report flows from top to bottom on the left-hand side, then top to bottom on the right-hand side. The three-hole punch on the left-hand combined with a tri-fold enables A3 reports to be stored in standard three-ring binders. While the names of the boxes can change, the basic storyline remains the same, as will be explained in the following subsections. Successful A3s are done at the frontline, either directly by or validated by the people doing the work.

2.1 Theme & Background

Every report starts with a "theme" or "issue" title. The theme indicates the problem being addressed, and is fairly descriptive. The theme should focus on the problem, and not advocate a particular solution (e.g., "Interruptions to Pharmacists work resulting in long turn-around times," not, "Hospital units calling instead of faxing inquiries to Pharmacy"). If the customer is apparent in the issue, it should be stated through the perspective of the customer (e.g., sometimes patient care is delayed waiting for medications from the pharmacy)

Next, the A3 report author describes any pertinent background information that is essential to understanding the extent and importance of the problem. Items that might be require_onced in this section are how the problem was discovered, why the problem is important to the organization's goals, the various parties involved, the problem symptoms, past performance or experience, organization structure, and so forth.

2.2 Current Condition

This section is perhaps the most important section in the A3 report. The author draws a diagram that depicts how the system that produced the problem currently works. Problems are highlighted where they occur on the diagram with storm bursts. Also, the author should quantify the extent of the problem (e.g., percent defects, hours of downtime, etc.), and display this information graphically or numerically somewhere in the current condition. The diagrams should be neatly drawn, and readily understandable to any knowledgeable reader. Helpful toward this end is a set of standard icons for different entities. We have developed a set of icons useful for hospitals, but any set of simple, easy-to-draw, yet descriptive icons will work. The goal of the current condition diagram is to use as few words as possible to illustrate how a piece of work currently performs.

The data used to develop the current condition diagram are collected through *direct observation*. In-depth and detailed understanding of the current process as it is actually performed, rather than how it should be done or how someone says it is done, is absolutely critical. Workers and supervisors can often describe how the process generally works, or how it is supposed to work, but deviations from this general or hypothetical conception usually hold the key to addressing the problem. So direct observation is needed to realize this information. The data for describing the extent of the problem should also be actual data, perhaps collected in a logbook if necessary, not

educated guesses. The power of direct observation is the objectivity of the information, void of emotion or assumption.

The purposes of diagramming and quantifying the problem are several. First, the act of drawing a diagram helps the author come to a deeper understanding by forcing him/her to organize knowledge and learning gained from observation in a compact manner. Second, the diagram quickly and effectively communicates the core issues to others. The graphical medium can contain a very dense amount of information, and yet readers can pick it up quickly because of the pictorial representation. Thirdly, by diagramming the system, problem-solving efforts are focused on the system rather than the people. It results in a much more objective approach with less defensive posturing and finger-pointing. Our experience has been that problem-solving efforts often fail in implementation because the author(s) did not sufficiently understand the current condition. Rarely is failure due to incompetence or lack of ingenuity.

2.3 Root Cause Analysis

As the author comes to understand the current condition in a deep and meaningful way, it becomes imperative that s/he comes to understand the root cause of the problem symptoms. Failing to address the deeply rooted seed of the problem means it will likely recur. A common technique for root cause analysis is the "5 Why's" method. The problem-solver simply asks a why question approximately five times in series. Experience has shown that stopping at two or three why's usually means that the inquiry has not gone deep enough. To illustrate the 5 Why's method, let us consider the problem a student might have with low quiz grades.

Question 1: Why did I not score well on the quiz?
Answer: I didn't study.

Question 2: Why did I not to study?
Answer: I overslept the morning of the quiz.

Question 3: Why did I oversleep?
Answer: I stayed up too late the night before.

Question 4: Why was I up so late?
Answer: I was socializing.

Question 5: Why was I socializing instead of thinking about my studies?
Answer: ???

From this example, we can see that forgetting to study or oversleeping, while certainly causes of poor quiz performance, are not at the root of the problem. Question 5, on the other hand, gets to some deeply rooted issues of priorities and purpose. This example also illustrates that the questions depend on the answers to previous questions. Had the answer to first question been "I didn't think I needed to study" or "I didn't know there was a quiz," the line of inquiry would have been totally different. In addition, some discretion is needed to guide the line of inquiry in productive directions, and to ask the tough, deeply probing questions. For example, instead of

asking question #3, it may have been better to ask why studying was left to the last minute. On the other hand, if question #5 had been simply "why was I socializing?", the answer may not have been terribly enlightening.

Thus, guiding the 5 why's inquiry requires judgment and discretion on the part of the problem-solver. One possible guide is whether the inquiry touches on at least one of three basic principles for design of organizational systems: 1) Are *activities* sufficiently specified according to content, sequence, timing, and outcome? 2) Are *connections* between entities clear, direct, and immediately comprehended? 3) Are the *pathways* along which goods/services travel simple, direct, and uninterrupted? Spear and Bowen [9] identified these principles as the DNA of the Toyota Production System in their extensive study. We have yet to encounter a failing system that does not violate at least one of these principles. So to help guide the 5 why's inquiry, the problem-solver might consider whether activities, connections, or pathways are at the root of the problem.

2.4 Target Condition

Now that the problem-solver has a keen understanding of how the work currently gets done, and has a good grasp of the root cause(s) of the problems experienced with the system, s/he is now ready to consider how the system might be improved. Toyota calls the improvements *countermeasures* (rather than the ubiquitous "solutions") because it implies that a) we are countering a specific problem, and b) it is what we will use now until we discover an even better countermeasure. The countermeasures address the root cause(s) while conforming to the three design principles. The goal is to move the organization closer to an ideal state of providing exactly what the customer (patient) needs, safely, when needed, in precisely the right quantity, and without waste.

With countermeasures in mind, the author draws a diagram of the target condition; that is, a diagram of how the envisioned system will work with the countermeasures in place. The countermeasures can be noted on the diagram as fluffy clouds, or noted separately. Like the current condition, the target condition diagram should be neat and clear to all who read the report.

2.5 Implementation Plan

The implementation plan outlines all the steps that must be accomplished in order to realize the target condition. The author lists the steps, when they need to be done, and who is responsible. Since implementation is an activity, it should conform to the design principles for planning activities (i.e., specify the content, sequence, timing, and outcome).

2.6 Follow-up Plan

How will the organization know that the new system is actually better than the old? The follow-up plan indicates how and when the author (or other designate) will measure the improvement of the system. It should require_once a realistic and quantified prediction of how the new system will perform (e.g., X% decrease in defects, or turnaround time reduced to Y minutes). The

prediction should be as accurate as possible, based upon the author's deep understanding of the work and the countermeasures planned. It should not be a shot in the dark, or an unrealistically ideal case. For example, while ideally we would like to see zero defects, will the countermeasures envisioned realistically achieve zero defects? If not, how many defects can we expect with the new system?

2.7 Results Report

This section is an adaptation to Toyota's A3 report system. Toyota problem-solvers draft a special A3 status report to report on follow-up results. It is fairly extensive, including a list of shortcomings and plans to address them. We decided to incorporate the reporting of results on the original A3 in order to simplify the A3 report system and increase its acceptability. So we leave space at the end of the A3 report to record the actual results in comparison to predictions. If the new system still has problems, then another A3 problem-solving report can be generated.

The follow-up results reporting step is absolutely critical to maximizing learning within the organization. As Spear and Bowen [9] elucidate, Toyota indoctrinates its people with its own version of the scientific method—every improvement is designed as an experiment. The A3 problem-solving process is a structure to implement the scientific method. The current condition and root cause constitute the necessary background research, the target condition and implementation plan outline the experimental design, and the follow-up plan states the hypothesis. So the results reporting section is critically important for evaluating whether the hypothesis is supported. If so, we confirm our understanding and move on to the next problem. If not, we know that our present understanding of the work is incorrect or insufficient, and additional background work is needed. If we fail to make the hypothesis, or if we fail to measure the results, we have no real test of our understanding, and as Lord Kelvin once said, our knowledge will be of a meager and unsatisfactory sort.

3. An Example

We have used the A3 tool on dozens of problems in a healthcare setting. Here we illustrate the A3 problem-solving process described in the previous section with an actual A3 report used to address a difficult interdepartmental issue.

The hospital where this study was done desires to reduce high accounts receivable (A/R) days, i.e., the time between rendering a given service and receiving payment for that service. One area of the hospital with higher-than-average A/R days is the emergency department. To actually generate a bill, the patient's medical file (or chart) must be "coded," that is, assign a numerical code for each service rendered for the purposes of insurance billing. Coders need a transcription of the physician's dictation of the visit to ensure the accuracy of the coding, and to comply with accreditation regulations. Emergency Department dictations are transcribed by a third party (Ultramed), and the transcriptions are then downloaded in the Hospital Information Management (HIM) Department who does the coding for all hospital patient accounts. In this example, HIM was experiencing problems receiving transcriptions and matching them to patient files.

Figure 1 shows the theme and background of the A3 report generated on this problem. Frequently transcriptions could be available from Ultramed and even downloaded, but would not get matched with patient files. Thus, patient files waited in queue unnecessarily resulting in delays in bill drop date (authorization for bill to be sent) and increasing A/R days. In addition, HIM staff spent significant effort keeping track of patient files and transcriptions, following up on late dictations, and so forth.

Figure 1: Example of an A3 Theme and Background

A graduate research assistant, in an effort to learn the A3 process, observed first-hand what happens to patient charts and transcriptions after the patient is discharged from the emergency room (ER). In addition, he informally interviewed HIM coders and supervisors, and ER physicians, nurses, and technicians to make sure no steps were missed, and to uncover aberrations to the general procedure. The diagram in Figure 2 represents the culmination of his understanding of the process. Upon discharge, the physician who saw the patient records the dictation over the phone to Ultramed (similar to a voicemail), then jots an Ultramed job number on the patient chart. The patient's chart is sent to HIM where it is placed in file holder. Meanwhile, Ultramed transcribes the dictation, and posts it to a limited access web site. A designated HIM staff member periodically checks the web site, prints the transcriptions, and places them in designated location ordered by date. Another HIM staff member periodically matches the stack of transcriptions to the patient charts. If s/he discovers a chart without a job number (meaning a dictation had not been made), the chart goes back to the ER for a dictation. A chart with a job number but no transcription requires follow-up with the transcription company. If all goes well, a pool of coders retrieves the completed charts for coding. Occasionally an HIM coder must manage a "crisis" because the chart is incomplete for coding, but somehow the transcription cannot be found.
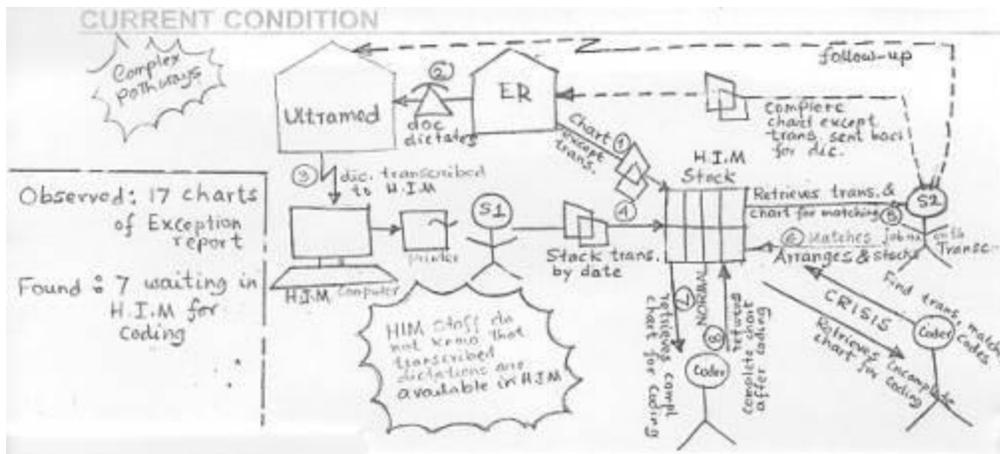
Figure 2: Example of Current Condition

The diagram in Figure 2 notes that transcriptions can be available without HIM's knowledge. In one day's exception report for delayed bills, 17 charts were identified as awaiting transcriptions in HIM, but of those, 7 transcriptions were already present in HIM! In other words, seven transcriptions had been made, but had somehow become lost or misplaced in the system thus delaying bill processing on those accounts. Also, the process's pathways are complex, with multiple routes possible through the system and repetitive handling of patient charts.

As the team investigated why chart coding was being delayed, it became clear that the complexity of pathways made it difficult for the HIM staff to manage the flow of charts through their department. No one could see easily where charts needed go next. It also became apparent that the system lacked clear signals for indicating when ER physicians had done their dictations, when transcriptions were ready for download, or when transcriptions had been downloaded but not yet mated with patient charts. The root cause analysis shown in Figure 3 documents the 5 why's analysis of the observed problem.
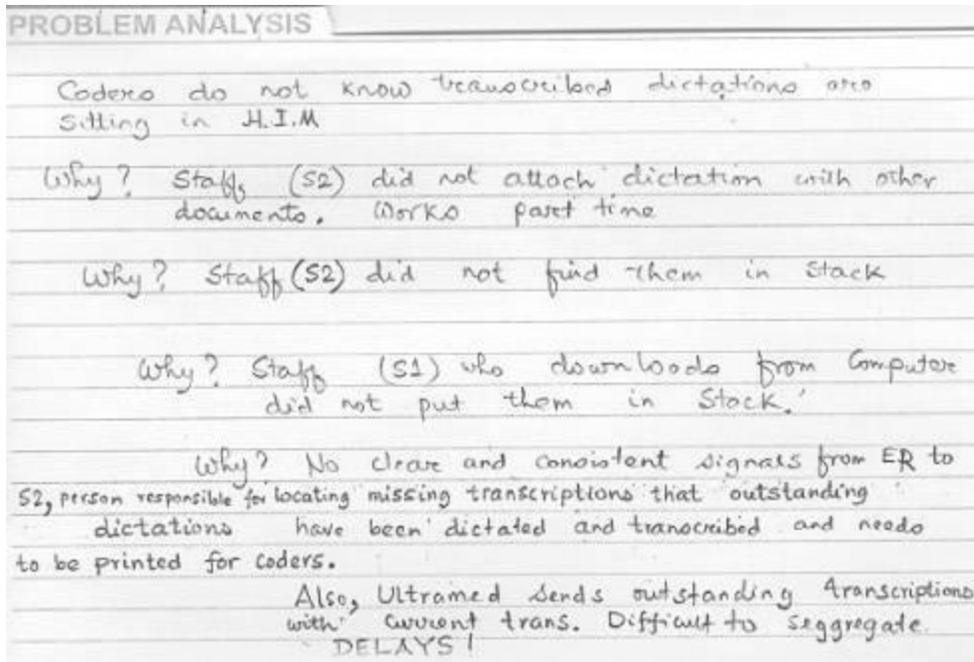
Figure 3: Example of Root Cause Analysis

After considering a number of options, the primarily countermeasure selected was to receive the transcriptions in the emergency department and mate them with patient charts before sending them to HIM. This would eliminate the set of work around loops in HIM altogether, and cut down confusion because the emergency department is in much better position to manage the relationship with Ultramed (i.e., they know whether a dictation has been made and when). The process becomes greatly simplified (from HIM's perspective, at least), as shown in Figure 4. Moving receipt of transcriptions to the emergency department meant a change to the ER work processes, but represented little added workload.
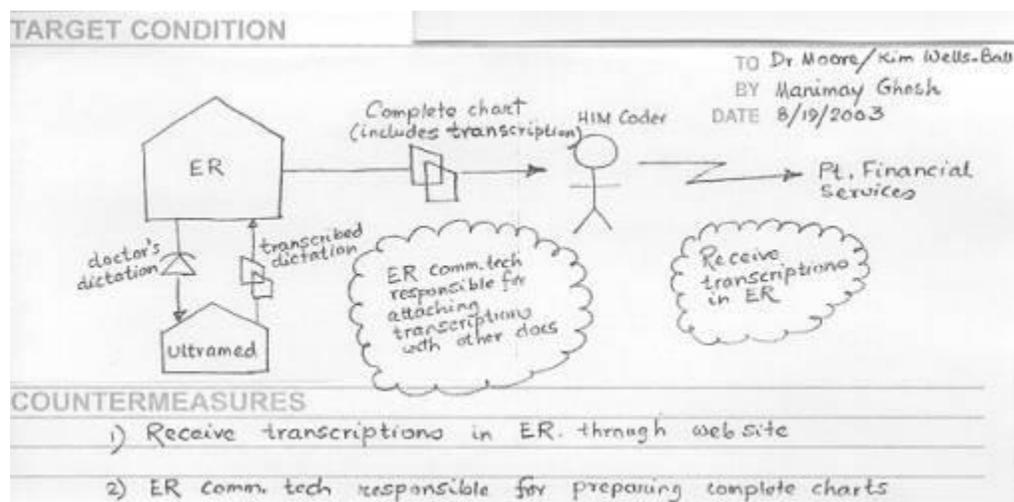

Figure 4: Example of Target Condition

The next step was to devise an implementation plan so that the new procedure could be put into place with minimal disruption and maximum likelihood of success. Figure 5 indicates that a critical step was to work with the information systems department to set up the necessary hardware and network link to accomplish the move. Representatives from both the ER and HIM participated. In the end, all that was needed was to move the computer and printer dedicated to transcription downloads to the ER, and connect it to the hospital's network. The remaining steps (items 2-4) were to communicate the change and train the ER doctors and ER and HIM staff in the new procedures.

Figure 5: Example of an A3 Implementation Plan

The follow-up plan for this A3 report was fairly simple (Figure 6). After the implementation date of September 1, the hypothesis was that 100% of charts from ED would reach HIM with transcriptions, and that the bill drop time would drop to 7 days or less. Ideally, the follow-up date would have been specified, but was not on this report. The actual follow up occurred 1.5-2 months later. Out of 371 charts over a two-week period, over 98% arrived with transcriptions. Also, bill drop time averaged 6.55 days. The problem-solving effort was successful!

Figure 6: Example of an A3 Follow-up Plan

One of the reasons the follow-up did not occur earlier was that the implementation ran into a glitch. A second A3 report was generated on the work processes within the ER as a result of receiving transcriptions there instead of in HIM. The second round of A3 problem-solving was successful, and resulted in significant improvements in bill drop time and personnel time hounding "missing" transcriptions.

4. Implementation: The A3 Cycle

We have found the A3 problem-solving report to be a powerful tool for process improvement when used by individuals or teams. 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 via Toyota. To do this, the A3 problem-solving report becomes the centerpiece of an organization-wide cycle of improvement.

4.1 Problem identified

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 the problems. While management could certainly direct the organization to work on particular problems, it appears to be more effective when the individuals at lower levels within the organization identify problems in their daily work routines that hinder them from doing their best work productively. The reason for this is that upper-level managers tend to identify problems that are large in scope, with many sub-problems intertwined, numerous nuances and conflicting considerations, and affecting a large number of people. In other words, they want to bite off too much. Workers, on the other hand, tend to look at 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 make the big problems disappear. So, an individual in the organization identifies a problem that frequently makes his/her job unnecessarily difficult or burdensome.

4.2 Problem studied

The next step is for the problem-solver to study the problem. S/he observes the process, gathers data, interviews those affected, observes some more, analyzes for root cause(s), etc.; in other words, all the leg work needed to complete the left-hand side of the A3 report.

4.3 Input gathered

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

4.4 Future state envisioned

With all the background research as a foundation, the problem-solver then creates a target condition that includes the countermeasures and a diagram depicting how the new system will work. The target condition conforms to the three basic design principles regarding activities, pathways, and connections. S/he also carefully thinks through an implementation plan and devises a follow-up plan. S/he predicts the performance of the new system in quantitative terms as accurately as possible. The right-hand side of the A3 report documents the end result of these efforts.

4.5 Consensus created

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 (including 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 the process continuous until all the key players are agreeable.

4.6 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. Once the A3 report is approved, implementation proceeds as planned.

4.7 Follow-through

The last step in the cycle is to follow-up the implementation. Did the new process achieve the expected results? Often, the answer will be "no." This represents a new problem, and cycle starts over again.

5. Benefits / Why it works

We have successfully applied the A3 problem-solving tool and approach to problems that had been attempted (unsuccessfully) in the past using other problem-solving methods. We hypothesize that the success stemming from use of A3 reports is due to several key factors.

First, unlike most other approaches, the A3 method demands the documentation of how the work actually happens. The best (and probably most credible) way to document the actual work is to observe it first hand. Recreating the process from memory in a conference room removed from the where the work physically occurs will result in inaccuracies and overgeneralizations. Most often, it's the aberrations to standard protocol and the small, easily overlooked details of the workplace that cause the inefficiencies or quality issues.

Second, A3 reports enable the people closest to the work to solve problems rather than just work around them. The A3 reports do not require long hours of specialized training. They can be (perhaps should be!) drafted with pencil and paper, so would-be problem solvers do not need access to a computer. Simply, the most effective problem-solving occurs when it is done as close to the work as possible. Toyota does not distinguish between people who do the work and people who solve problems. Everybody's job is to solve problems and improve. The reason for this is that processes tend to be much more complex than we initially realize. An outsider coming in to redesign the process may be able to look at things from a fresh perspective, but will be ill-

positioned to fully grasp all the subtleties, issues, and concerns simply because they have not lived it. Proposed systems that do not take these into account are doomed to sub-par performance, even outright failure. The worker, though, has lived it, and can be the best source of ideas and critical review.

Third, the iconic nature of the process diagrams makes them a closer representation of the actual systems compared to other process representations such as flow charts. As such, authors are able to "see" their problems more clearly and readers grasp the systems more readily. In addition, these diagrams serve as highly effective boundary objects between individuals and organizational units. Having a physical artifact that both sides can literally point to and discuss facilitates communication and knowledge sharing [10].

Finally, the A3 report represents a thorough problem-solving approach, from problem identification to analysis and solution generation, all the way through implementation planning and follow-up. Yet, it is succinct—two letter-sized pages. The combination is powerful. Plus, concisely documenting process improvement and follow-up results enables sustained organizational learning while meeting the requirements of accreditation. In other words, the documentation is a necessary part of the process, not an added burden to be hastily completed after the fact (and often after the shift is over!).

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 have encountered is simply making the time to do the problem solving. healthcare 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 the 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, providing sufficient resources, and getting out on the floor to see 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 a network of coaches is instrumental in any organization-wide deployment. Yet getting these individuals identified and trained has been 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 have 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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References

- Womack, J., D.T. Jones, and D. Roos, 1990, *The Machine that Changed the World: The Story of Lean Production*, Harper Perennial, New York.
- Cusumano, M.A., 1985, *The Japanese Automobile Industry: Technology and Management at Nissan and Toyota*, Harvard University Press, Cambridge, MA.
- Liker, J.K. (ed.), 1998, *Becoming Lean: Inside Stories of U.S. Manufacturers*, Productivity Press, Portland, OR.
- Iglehart, J.K, 1999, "The American healthcare System – Expenditures," *The New England Journal of Medicine*, 340(1), 70-76.
- Sigma Theta Tau International Honor Society for Nursing, 2001, "Nurses for a Healthier Tomorrow: Facts about the Nursing Shortage," URL: http://www.nursesource.org/facts_shortage.html.

- Institute of Medicine, 2000, *To Err is Human: Building a Safer Health System*, a report of the Institute of Medicine, Washington, DC.
- Blumenthal, David (1999), "healthcare Reform at the Close of the 20th Century," *The New England Journal of Medicine*, Vol. 340, No. 24, June 17; pp. 1916-1920.
- Sobek, II, D.K., 1997, *Principles that Shape Product Development Systems: Comparing Toyota-Chrysler*, Ph.D. dissertation, The University of Michigan, Ann Arbor.
- Spear, S. and H.K. Bowen, 1999, "Decoding the DNA of the Toyota Production System," *Harvard Business Review*, Sept.-Oct., 77(5), 97-106.
- Carlile, P.R., 2002, "A Pragmatic View of Knowledge and Boundaries," *Organization Science*, vol. 13, no. 4, Jul-Aug. 2002; pp. 442-455.

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