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AN OBSERVATIONAL STUDY OF THE METHODS AND PROGRESS IN ENTERPRISE LEAN TRANSFORMATION AT A LEARNING HEALTH CARE ORGANIZATION

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THESIS

A thesis submitted in partial fulfillment of the
requirements for the degree of Master of Science in Manufacturing Systems Engineering
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at the University of Kentucky

By

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ABSTRACT

AN OBSERVATIONAL STUDY OF THE METHODS AND PROGRESS IN ENTERPRISE LEAN TRANSFORMATION AT A LEARNING HEALTH CARE ORGANIZATION

The health care industry in the United States is increasingly pressured to improve safety and quality performance and increase revenue. In response, many health care institutions are moving to redesign their processes and practices in an effort to decrease costs and provide safer, higher quality, and more efficient care. The purpose of this paper is to document the Lean implementation strategy and progress in implementation at a large teaching health care organization undergoing Lean transformation in order to understand enterprise transformation strategies and the impact of leadership involvement on culture development and Lean implementation. Through direct observations and involvement and transformation activities, the methodology for Lean transformation and progress in implementation were documented and analyzed. The organization employed an outside consultant to assist with transformation activities, and underwent a three-pronged approach to implementation, which included model area development, team member problem solving training, and management-led problem solving activities. It was found that leadership involvement was lacking, especially at the highest levels, and the organization struggled to build the culture necessary to support transformation and develop an operational model area, though successes were realized in efforts to train employees in Toyota's 8-Step Problem Solving method and in management-led problem solving activities.

KEYWORDS: Enterprise Lean Transformation, Lean Health Care, Model Area, Lean Implementation Strategy, Management-Led Problem Solving

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I dedicate this thesis to my family and loved ones who have always supported me and to those who have encouraged me to always strive for more.

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1: INTRODUCTION

The Toyota Production system was developed based on an inductive approach, which is often called Monozukuri, the traditional Japanese craftsmanship and intuitive intelligence. For this reason, it may be difficult, although not impossible, to correctly interpret the essence of the Toyota Production System based on logical thinking, which is reductive scientific method (Saito and Futamura, 2009, Saito, 2008). Because of these difficulties, many companies fail to sustain Lean culture and transformation in their organizations. Recently, there has been a push to sustainably implement Lean and the Toyota Production System within the health care industry.

The health care industry in the United States is increasingly pressured to improve safety and quality performance and increase revenue. Patients and insurance companies are demanding safer, more efficient, and more quality-driven health care systems (Dickson et al, 2009a). Furthermore, government agencies look for ways to reduce healthcare spending while simultaneously increasing levels of service (Waring and Bishop, 2010). The demand for health care services is on the rise as society ages, but financial conditions for health care systems continue to deteriorate (Poksinska, 2010). Hospitals experience crowding because of inefficiencies in their systems, which make it difficult to meet the increasing demand for health care services (Dickson et al, 2009b). Not only do these demands have an impact on the bottom line for a health care organization, but they can also have a major impact on the work that clinical staff must do (O'Neill et al, 2011).

These negative trends in health care, including rapidly increasing health care costs, reductions in funding and reimbursement rates, especially under Medicare, and

quality and safety issues are moving many health care organizations to redesign their systems and transform their organizations (Dickson et al, 2009a, Steed, 2012, Johnson et al, 2012). To combat these pressures, it has been suggested that health care companies begin to reform their practices; there is a need to develop and put in place sustainable management systems that encourage and enable creative and innovative solutions and improvements to the health care delivery process (Dickson et al, 2009a). Health care organizations are challenged to be as affordable, cost effective, safe, thorough, and efficient as possible (Poksinska, 2010). Many health care organizations, in an effort to ease these pressures and improve performance, have implemented quality improvement strategies and management systems. One of these strategies has proven successful in many health care companies and has gained international interest over the last decade: Lean health care (Waring and Bishop, 2010). Lean methods are a useful way to clarify and address critical issues in health care (Jenkins and Gisler, 2012). Lean provides a methodology to reconfigure clinical leadership, establish working practices, and streamline clinical practices (Waring and Bishop, 2010). Furthermore, Lean enhances the ability of health care staff to find better ways to take care of patients, enhances value-added process steps, and facilitates the elimination of wastes within health systems that fail to add value (Poksinska, 2010).

This paper will investigate and document the enterprise Lean transformation efforts at a major learning health care institution in an effort to understand successful and unsuccessful strategies for implementing Lean health care systems, understand problems encountered with Lean implementation in hospitals, and document a model for enterprise Lean transformation in health care. This paper will also seek to understand the impact of

leadership involvement in Lean transformation on culture development and Lean implementation and how culture development impacts other areas of implementation, such as problem solving. It is proposed that poor leadership involvement leads to less than optimal buy-in for transformation throughout an organization and cultural development issues, which manifest in other areas of the transformation, including problem solving, thereby impeding the progress of enterprise transformation.

1.1 Lean and the Toyota Production System

1.1.1 History of the Toyota Production System and Need Driven Change

Sakichi Toyoda started the path to the Toyota Production System (TPS) in the 1920s through the establishment of Toyota Automatic Loom Works. Kiichiro Toyoda, the son of Sakichi Toyoda, later expanded the production capabilities of the company, adding an automobile department to the weaving machine manufacturing abilities. In 1937, Kiichiro established the Toyota Motor Corporation, and thus began Toyota's path to prominence as an elite automobile manufacturer (Badurdeen, 2012).

As the Toyota Motor Corporation grew, economic hardship had an impact on the company. The post-World War II era led to a revitalized economy, but high inflation led to cash flow problems for the company (Badurdeen, 2012). To avoid bankruptcy, Kiichiro Toyoda had to make pay cuts throughout the company, ask for voluntary retirements from employees, and stop work in some cases. Kiichiro took responsibility for these economic woes, and stepped down as president of the company (Badurdeen, 2012). After these hardships, it was evident that there was a need to create a production system that would not only thrive in good economic climates, but also sustain during periods of zero economic growth. American companies utilized mass production to

increase profits, which cut costs by producing large quantities of fewer types of cars. However, recognizing that their customers had a wider range of needs in a smaller market, Toyota sought to develop a system to cut costs while producing a small number of many types of cars – a situation not fitting of the American mass production style (Ohno, 1988).

As the Toyota Production System (TPS) took shape, driven by the need to meet customer demands and sustain profits even during economic recessions, other companies began to take notice of Toyota's system of producing many models in small numbers, cheaply. Taiichi Ohno, who is largely credited with developing TPS, had helped to transform the company, through waste elimination and just-in-time principles, to a successful and profitable manufacturing operation (Saito et al, 2012). The oil crisis in 1973 led to the collapse of economies and affected governments and companies throughout the world. However, despite the poor economy, Toyota sustained greater earnings than other companies in 1975, 1976, and 1977 (Ohno, 1988). The widening gap between Toyota and other manufacturers began to make people question what Toyota was doing differently. This success during tough economic climates led to much investigation of TPS. In 1979, MIT developed the International Motor Vehicle Program to study the challenges facing the automobile industry, and, in 1991, Womack, Jones, and Roos published *The Machine that Changed the World: The Story of Lean Production – How Japan's Secret Weapon in the Global Auto Wars That is Revolutionizing World Industry*. This book studied TPS and was the first to coin the term "Lean" to describe the way Toyota produced cars (Badurdeen, 2012).

1.1.2 Principles of the Toyota Production System

Many benefits can be realized through the use of Lean manufacturing principles, including increased production capacity, higher quality, high cost reductions, increased customer satisfaction, and improved employee morale (Mathaisel, 2005, Badurdeen, 2012). Though these benefits can be realized through the implementation of a Lean management system, there are many misconceptions about what Lean is and how it is achieved.

Many companies believe that Lean is simply a set of tools. In an effort to achieve quick results, many companies and industries have tried to adopt only those lean tools that allow for quick results, however, this is not recommended to become a truly Lean organization (Mathaisel, 2005). Another misconception is the assumption many companies have about the stasis of TPS; that is, TPS is actually a dynamic system that continues to change and develop over time which requires constant and consistent leadership engagement and participation (Marksberry et al, 2010). The Toyota Production System is not a revolutionary change that can happen overnight, it is not a set of quick fixes enacted by management, it is not self-directed teams, it is not in the head of leadership for employees to figure out, and it is not a system of blame when discovering the cause of problems. In reality, TPS is an evolutionary change that takes time, it is not a quick fix to eliminate the root cause of problems, it is involved team members working to develop methods to improve their own work, it is on-paper solutions that are taught to employees by management, and it is a system to find out why a root cause has occurred, not who is at fault (Badurdeen, 2012).

To successfully implement Lean, one must understand the definition and principles of Lean and TPS. Taiicho Ohno, the creator of TPS, states that TPS is a system for the total elimination of waste (Ohno, 1988). Lean has also been described simply as using less to do more to create a perfect process where every step is valuable to the customer, capable of creating good results every time, available to produce the desired output, adequate enough to not cause delays, flexible, and linked by continuous flow (IHI, 2005). TPS is a system in which improvements are made continually in response to issues that arise, where the system itself reveals the problems at the time that they occur (Parks, 2002). Lean is a practice that is based in continuous improvement and aims to increase value and reduce waste, variation, and poor working conditions (Radnor et al, 2012). It involves setting standards to eliminate waste (Allen, 1995). TPS provides the tools for people to continuously improve their work and add value to their product or service and motivates workers and managers to be flexible to change (Dickson et al, 2009b). In summary, true Lean can be defined as the group who does the work, improving their own work through systematic problem solving towards the achievement of the company's targets and goals when the company's culture is the reason that the activity is occurring (True Lean Systems Program).

It is generally accepted by many in industry that there are five principles of Lean as identified by Womack and Jones in their book *Beyond Toyota: how to root out waste and pursue perfection*. These principles are: specifying the value created by the process, identifying value streams for the processes, creating flow throughout the processes, establishing pull to meet the needs of the customers, and striving for perfection through continuous improvement (Waring and Bishop, 2010, Radnor et al, 2012, O'Neill et al,

2011). However, these principles seem to leave out a major component of Lean and TPS that must be understood in order to achieve Lean and be successful and sustainable: worker involvement and empowerment. Empowering workers by providing them with the tools and culture to drive changes in their work area is a cornerstone of TPS, and, once a worker is indoctrinated into the Lean philosophy, they can begin to drive out waste and strive for continuous improvement using the five principles outlined (Dickson et al, 2009b).

TPS and Lean can be described as having two sides: a hard-side and a soft-side. The hard-side is the operational tools and techniques that are utilized to improve the work and the soft-side is the underlying fabric and culture that allows Lean to succeed, and success in Lean transformation comes from applying both of these aspects together (Badurdeen et al, 2010a). Figure 1.1 demonstrates the hard- and soft-sides of TPS as described at Toyota (Toyota). The respect for people and emphasis on teamwork that is described in the soft-side lays the groundwork for the continuous improvement tools of the hard-side to be successful.

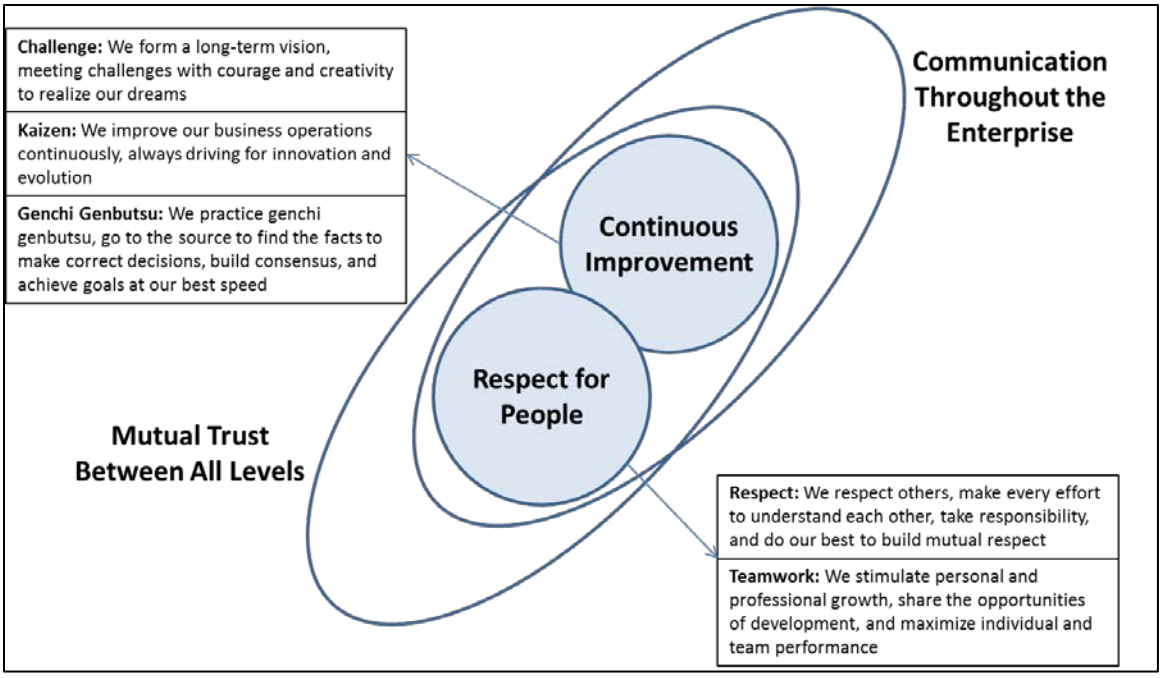


Figure 1.1: Figure outlining the Toyota Way as shown by Toyota Global.

A common way to describe the tenets and philosophies of Lean and TPS is through use of the Toyota Production System House. The TPS house is built upon the Toyota philosophies and goals, which can also be described as the soft-side principles. The philosophies include customer first, respect for humanity, and the elimination of waste. For the customer, lowest cost and highest value products are achieved by utilizing the Toyota pricing philosophy, which states that the selling price that the customer is willing to pay minus production cost is equal to profit, as opposed to other companies who use the formula of selling price equals costs plus profit (Ohno, 1988). Putting profit as the remainder of what is left after operating costs are subtracted from the value that the customer associates with the product drives continuous improvement and emphasizes waste elimination. Goals are outlined for the customer, for the employee, and for the company, and all other actions within TPS are rooted in these goals and philosophies. The foundation of the TPS is standardization, which is a framework for improvements

(Saito et al, 2012). The two pillars laid upon the foundation of standardization are autonomation and just-in-time (Ohno, 1988). Autonomation involves giving machines and the production line the power to stop when a problem or defect occurs. This pillar is also known as jidoka or jidoka management, and instills the thinking that problems should be highlighted to prevent mistakes in the system. Jidoka is the most essential element for achieving high quality and sustainable production (True Lean Systems Program). Just-in-time means producing only what is needed, when it is needed, in the quantity required by the customer. Covering the TPS house is a roof of kaizen, or continuous improvement. The continuous improvement, or hard-side of Lean, is what enables Toyota to continue to be successful. Figure 1.2 shows a version of the TPS house adopted from the University of Kentucky Lean Systems Program.

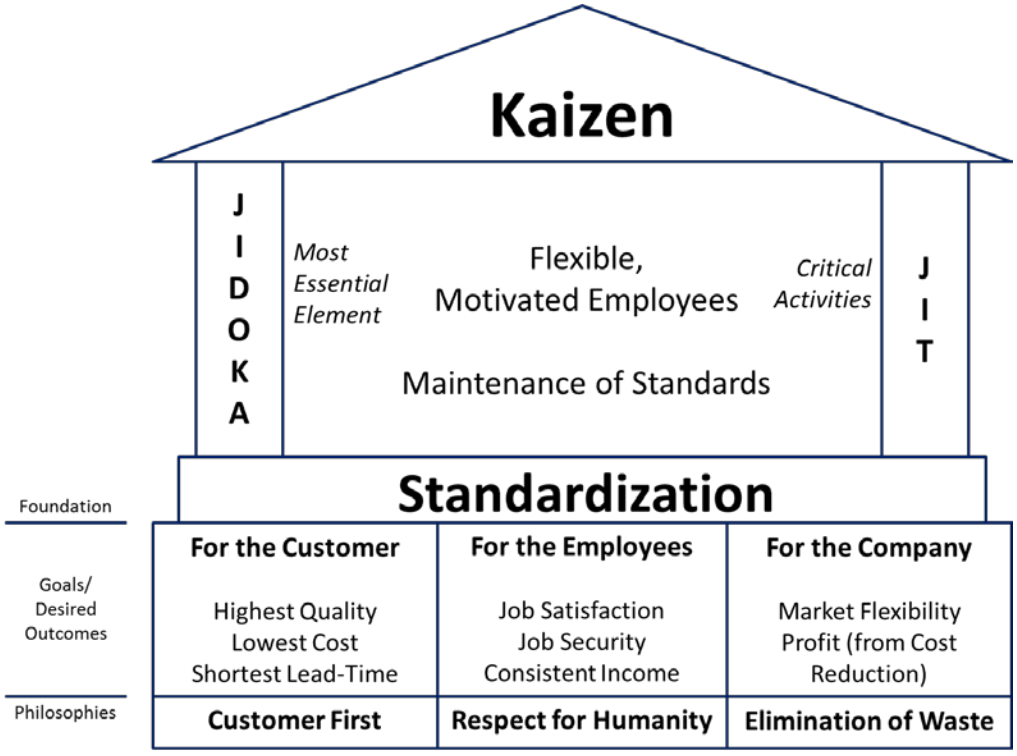


Figure 1.2: TPS House as adapted from the University of Kentucky Lean Systems Program.

1.1.3 Soft-side of Lean

It has been stated that the cornerstone of TPS is the empowerment of the workers to effect changes in their area, which involves entrusting workers to have greater responsibility and make changes in their work area, as workers are closest to the problems and should have the authority to stop the line as problems arise, which happens hundreds of times per day at Toyota (Dickson et al, 2009a, Badurdeen et al, 2010a, Saito et al, 2012). This worker empowerment is a direct result of the soft-side of Lean. The soft-side tools that Toyota has mastered are directly related to the culture that they have established throughout the company and are a major reason why they have been so successful, but the soft-side concepts are also the hardest to grasp for companies that are undertaking a Lean transformation. Culture at Toyota can be defined as the way the workers think and act every day (Liker and Hoseus, 2008). However, though the TPS culture has become second nature to Toyota employees, it is a mystery to outside companies and is difficult to explain for those who have lived it (Liker and Hoseus, 2008). Toyota's culture is the most complicated, powerful, and difficult element in the Toyota Production System (Badurdeen et al, 2010a).

The culture of Lean is rooted in having respect for people. Respect for people means that people are treated with decency and that all workers are provided a physically, mentally, and emotionally safe environment in which to work where they can make full use of their capabilities and not have to be treated without consideration (Saito et al, 2012, Badurdeen et al, 2010a). Part of this environment includes providing people with the training to do their jobs well, which leads to the concepts of Hitozukuri and Monozukuri. Hitozukuri refers to the education and training that the workers receive, and Monozukuri refers to the creation of things in the production process, and requires

creative minds and is often related to craftsmanship (Saito et al, 2012, Saito et al, 2011, Saito, 2013). Hitozukuri, however, involves more than just training workers in methods; it involves training people to acquire the potential to apply their knowledge at their work sites to maintain conditions and respond to changes (Saito et al, 2012). Hitozukuri is the foundation for Monozukuri, and this is consistent with a main principle of TPS, which is that people are the most important asset for any company (Badurdeen et al, 2010a). Tying these concepts together, Toyota believes that they have the responsibility to train, guide, and mentor employees while producing things well (Badurdeen et al, 2010a).

It has been noted that the only sustainable process is one that participants believe in, and the best way to create belief is to involve workers in improving and changing the process (IHI, 2005). To involve workers in improving their own work and encourage them to make changes, there are some basic philosophies that must be put in place. The most important of these is job security. Job security is the factor that allows employees to do continuous improvement activity without worrying about losing their jobs (Allen, 1995). Having a no lay-off policy is critical to the success of Lean, as people will be more committed and engaged in improving work when they are not worried about improving themselves out of a job (IHI, 2005). Also, a standard must set to always treat people as adults, which means that decisions must be made with consideration to individuals' needs (Allen, 1995). These underlying cultural philosophies allow Toyota to excel at the hard-side tools that companies so often try to replicate. Figure 1.3 illustrates how culture is the underlying framework that allows Lean tools to be successful (Badurdeen, 2012). Shown as an iceberg, a majority of what makes Lean successful is the culture, which can't be seen in production metrics as it lies underneath the surface,

but allows the Lean tools, which do have an impact on metrics and improvements, to continue to float above the surface. Without the strong culture and respect for people to support the Lean tools, the tools would be unsuccessful and improvement efforts would flounder.

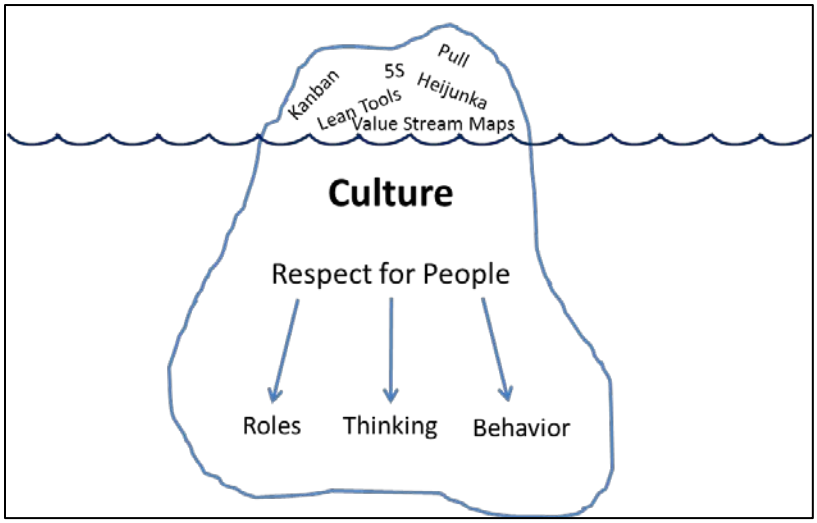


Figure 1.3: Iceberg illustrating that the underlying culture of TPS allows the Lean tools to be successful.

A table displaying many of the human elements that make up the soft-side and culture of the Toyota Production System are listed in Table 1.1 (Yang et al, 2012).

Table 1.1: Table showing many of the soft-side and cultural elements of TPS.

Utilization of People	• Cross-functional Teamwork • High Employee Involvement • Collaboration • Optimized Capability
Flexibility	• Multi-skilled Workers • Empowerment • Enlarged Responsibility • Authority to Make Decisions at all Levels
Employee Development	• Education and Training • Promotion of Leaders Internally • Development of Leadership at all Levels • Mutual Trust and Commitment • Motivation, Job Satisfaction, and Work Enrichment • Ongoing Development of People
Creative Thinking	• Creating Value for Employees • Capitalizing on Employees' Ideas and Suggestions • Pursuing Perfection
Respect for People	• Lifetime Employment and Job Security • Treatment of Employees as Family • Giving Employees Decision Making Power • Sharing the Company's Success

1.1.4 Hard-side of Lean

As discussed in previous sections, many companies attempting a Lean transformation choose to pick only tools to implement in hopes of realizing quick fix results, only to find that the results are not sustainable without laying a foundation of culture to support the tools. In this section, a variety of lean tools and their applications will be discussed.

As indicated in the definitions of Lean discussed in section 1.1.2, the goal of Lean is to drive out waste from systems in order to increase value-added activities while reducing or eliminating non-value-added work. As identified by Ohno (1988) there are seven production wastes that should be recognized:

1. Waiting

2. Overproduction
3. Defects/Rework
4. Motion
5. Over-Processing
6. Inventory
7. Transportation

An eight waste is also often considered, and that is non-utilized people or wasted intellect (O'Neill et al, 2011). Overproduction is the worst of all of the wastes because it can cause all of the others, and it misallocates production capacity because it results in unneeded inventory (Greenwood et al, 2002). Eliminating waste must be a company's first objective when utilizing Lean tools (Ohno, 1988).

One tool commonly used in a Lean enterprise is standard work. Standard work is developed by those doing the work by eliminating unnecessary steps, motions, delays, and other wastes (Greenwood et al, 2002). The concept of standard work is tied back to the cultural portion of TPS because it requires that employees be empowered to control and change their own work to best meet the needs of the job. Standards should not be imposed by management or forced down from leadership, but should be set by the workers themselves (Ohno, 1988). Standard work allows for other portions of TPS to be successful, such as just-in-time (JIT) production capabilities, kaizen improvements, and problem solving (Ohno, 1988, Saito et al, 2012). Standard work should be displayed and visible for the worker to use, and should be updated as improved standards are developed in order to be effective. Standard work is a direct link between the soft-side and hard-side tools and allows for the facilitation of many other Lean tools.

There are numerous other tools that can be discussed, and Table 1.2 lists many of these tools (Yang et al, 2012). When considering these tools, it is important to note that their success relies on the underlying culture of the company that exists to support standard work, problem solving, and implementation.

Table 1.2: Table showing many of the hard-side tools of TPS.

Autonomation	• Poke Yoke (Error Proofing) • Automation • Built in Quality Control
Just-in-Time	• Kanban • Visual Control • Production Leveling • Quick Changeover Methods • Lot Size Reduction • Continuous Flow • Pull Systems • Cycle Time Reduction
Manufacturing	• Cellular Manufacturing • Layout Design • Value Stream Maps • Single Minute Exchange of Dies
Waste Elimination	• Problem Solving • 5S • 5 Whys

1.2 Lean in Healthcare

1.2.1 Defining Lean Health Care

As outlined earlier, due to negative trends in health care, including rapidly increasing health care costs, reductions in funding and reimbursement rates, especially under Medicare, and quality and safety issues, many health care organizations are moving to redesign their systems and transform their organizations to Lean enterprises (Dickson et al, 2009a, Steed, 2012, Johnson et al, 2012, Waring and Bishop, 2010). According to a Thomson Reuters paper, the health care system in the United States costs as much as $700 billion each year (Poole et al, 2010). Furthermore, health care as whole seems to

keep adding processes while never taking any wasteful ones out of the system, and a movement is underway, led by Medicare and Medicaid, to pay for health care services based on quality and need instead of quantity, which is driving the health care industry to improve (Poole et al, 2010). Lean emerged through manufacturing, but, despite the fact that health care and manufacturing differ in many ways, there are also many similarities in manufacturing and health care that allow Lean principles to be applied to the delivery of health services (IHI, 2005). Lean is not simply a manufacturing technique or a cost-reduction strategy, but it is a set of management practices that are applicable to all organizations, no matter the industry, that lead to process improvements (IHI, 2005).

Though Lean is often perceived as a set of tools for process improvement, in health care, it is a philosophy that seeks to eliminate waste or non-value-added activities and add value to the patient experience (Dickson et al, 2009b, Poksinska, 2010). This means that health care workers must take care of patients and find better ways to take care of patients by improving processes (Dickson et al, 2009b). Lean allows for the elimination of wasted time, resources, and effort in healthcare (IHI, 2005). Through this elimination, Lean health care can create a system that is efficient, effective, and responsive to patient needs (IHI, 2005). More specifically, Steed (2012) has described Lean in health care as follows:

> "…the relentless elimination of waste in every area of operations with the aim of reducing inventory, cycle times, and costs, so that delivering higher-quality patient services can be provided in the most efficient, effective, and responsive manner possible, while maintaining the economic viability of the organization."

1.2.2 Challenges to Lean Health Care Implementation

Though the principles of Lean are applicable to health care fields, there are many challenges that face Lean implementation that are unique to the health care industry.

Firstly, health care in general has a reluctance to accept advice from industrialists (Poole et al, 2010). Skeptics of lean health care, specifically those providing the care and who are involved in the work, may argue that patients are not like cars and cannot be treated as such, also arguing that patients and illness require a customized approach that Lean cannot provide (Jenkins and Gisler, 2012). They believe that their processes and problems are too unique and complex to be solved with methods from industry and manufacturing (Poksinska, 2010). One specific example being that health care is capacity-led, which means that there is a limited ability to influence demand or free-up resources to expand business (Radnor et al, 2012). However, medical care is delivered in very complex organizations with many interacting processes, which is very similar to a manufacturing setting (IHI, 2005). For this reason, many Lean principles can be applied to improve the delivery of patient care.

Several staff issues arise in Lean health care applications that make Lean implementation more challenging. To start, few people in health care a trained and experienced in process improvement methodologies and there is a lack of available resources for moving forward with Lean (Steed, 2012, Dickson et al, 2009a). There are few educators and consultants who have health care backgrounds and have experience in real-life applications of Lean in health care (Poksinska, 2010). Staff tends to view lean as a set of tools imposed by management to only eliminate muda, or waste, and thereby neglect the aspects of Lean aimed at eliminating muri, overburden, and mura, unevenness (Radnor et al, 2012). This fact furthers skepticism amongst staff, as people typically fear that which they do not know. In some cases, clinicians have been especially resistant to performance improvement initiatives, citing that they fail to see how Lean increases

quality and argue that efficiency and productivity are being improved at the sacrifice of patient care (Waring and Bishop, 2010). Also, there is a perceived hierarchal structure of health care where physicians are seen as the dominant decision maker, and Lean requires collaboration, teamwork, and communication that have not typically been emphasized in professional training for physicians (Poksinska, 2010). Clinicians and staff also have concerns that standardization and structure in their work may cause them to lose their skills or make reallocation of staff more difficult within the unit, and they are resistant to break with their routines or accept standard work approaches, as they are very protective of their methods (Waring and Bishop, 2010, Dickson et al, 2009b, Greenwood et al, 2002). Furthermore, health care managers often are separated from the work, and have a difficult time assigning process improvement efforts to those doing the work (Dickson et al, 2009b). Challenges also arise from a lack of leadership commitment to change initiatives (Steed, 2012). Finally, turnover is high in some health care professions, which also poses challenges for implementation (Jenkins and Gisler, 2012).

There is much confusion when in health care when it comes to determining value. Determining what defines value for the customer is the key principle of Lean, allowing an organization to drive out waste and increase value in the eyes of the customer (Poksinska, 2010). However, the customer is not as easily identified in health care as it is in industry. One case study cited that issues arise when determining who the customer is; a critical step in the implementation of Lean (Radnor et al, 2012). This confusion could arise because there is a significant difference in who pays for the care and who receives the care, which makes it difficult to determine if organizations should work toward value based on the patients' point of view or the payers' point of view (Radnor et al, 2012).

Health care companies may have multiple customers, including the patients, family members, caregivers, communities, and tax payers (Poksinska, 2010). Further difficulties are encountered when determining value for the customer because patients typically are unaware of the price of their care, they cannot fully quantify the quality of service, and the expense that goes into delivering the service can be difficult to measure (Dickson et al, 2009a).

Because of the complexity of the system, health care systems have often been driven by internal customers, such as physicians, hospitals, insurers, and governments, when, in order for Lean to be successful, value must be defined for the patient, who is the primary customer (IHI, 2005). In many cases, health care processes have been designed not for the customer, but for the clinicians and how to minimize their waste and make them more efficient (Dickson et al, 2009a). However, changing this norm may be difficult. Hospitals fear that if they move to patient-centered processes and away from physicians, there may be a shift in admissions to physician-centered facilities (Dickson et al, 2009a).

Because of the need for improvement in the health care industry, many improvement methodologies and reform efforts have been put in place at health care companies. As a consequence, Lean efforts become lost and entangled in other reforms, becoming reinterpreted and reshaped from what they were meant to be (Waring and Bishop, 2010). After initial interest in Lean, clinicians disregard it as another superficial compliance, or "flavor of the month," or are overtaken by competition from other initiatives (Steed, 2012, Waring and Bishop, 2010).

Staff does not typically view themselves as working for a health care organization, but for a particular unit or care team (IHI, 2005). Health care companies are a complex system of many interdependent units, but Lean requires improvement of the entire enterprise, not just individual units (Poksinska, 2010). In order for Lean to succeed, staff must recognize the goals of the company and work as a whole to recognize those goals, utilizing one voice throughout to achieve Lean. Often in health care, Lean becomes a mess of disjointed and unconnected activities where a narrow range of tools and techniques is implemented to meet individual or departmental gains rather than a broad, system-wide approach (Radnor et al, 2012). Focusing on a few specific tools allows service providers to show quick wins, but they are not sustainable, and not sustaining improvements is a major issue faced in health care implementation (Poksinska, 2010, Steed, 2012). This tool-based implementation strategy may be contributed to the fact that Lean is not well understood and that there is often no formal incentive from the top of an organization to implement Lean in a structured way (Radnor et al, 2012).

1.2.3 Improvements Associated with Lean Health Care

Though not an easy task, implementation of Lean in health care can lead health care organizations to improve their operations and outcomes, lower cost, and increase satisfaction among patients and staff (IHI, 2005). Common improvements seen utilizing Lean health care applications include decreased patient length of stay, increased patient satisfaction, decreased patient wait time, reduction in inventory levels, increased number of patients seen, waste elimination, cost reduction, increased quality of services and patient safety, reduction in overtime worked, fewer errors and incidents, decreased patient care time, improved patient flow, workload reduction, increased employee satisfaction, reduction in travel and walking distance, and a calmer and more organized

work environment (Dickson et al, 2009a, Greenwood et al, 2002, Melanson et al, 2009, Belter et al, 2012, Johnson et al, 2012, IHI, 2005, Waring and Bishop, 2010, Radnor et al, 2012, Jenkins and Gisler, 2012, O'Neill et al, 2011, Poksinska, 2010). These benefits have been outlined in Table 1.3 to show their impact on the patients, workers, and health care companies. Benefits that applied to multiple parties are listed in all applicable columns.

Table 1.3: Table outlining benefits of Lean in health care for patients, employees, and health care companies.

For the Patient	• Decreased Length of Stay • Increased Satisfaction • Decreased Wait Time • Increased Quality and Safety • Fewer Errors and Incidents • Decreased Patient Care Time • Improved Patient Flow
For the Worker	• Waste Elimination • Reduction in Overtime Worked • Workload Reduction • Increased Satisfaction • Reduction in Travel and Walking Distance • Calmer and More Organized Work Environment
For the Company	• Reduction in Inventory Levels • Increased Number of Patients Seen • Waste Elimination • Cost Reduction • Improved Patient Flow

Two well-known success stories of Lean implementation in healthcare are Virginia Mason Medical Center in Seattle, Washington, and ThedaCare, Inc., in northern Wisconsin, though numerous other hospitals have also realized successes and improvements through Lean implementation. Virginia Mason Medical Center, after experiencing economic uneasiness and a general discontent in the organizational culture,

issued a mandate for change that lead to Lean implementation. Greater details of the Virginia Mason transformation will be discussed later, but, since implementation began in the early 2000s, Virginia Mason medical center has experienced financial and efficiency gains, advancement in Lean culture, decreased numbers of hospital acquired patient safety issues, and increased staff satisfaction (IHI, 2005). ThedaCare, already known as a high-tech, computer based health care institution, sought to improve quality and excite culture change at the onset of their Lean transformation. Since the onset of the Lean transformation, ThedaCare has seen millions of dollars in cost savings, decreases in staff work time associated with numerous tasks, and decreased time for completing patient care (IHI, 2005).

1.2.4 The Culture of Lean Health Care and the Involvement of People

The involvement of the people doing the work and the respect for their ideas and intellect is what lays the foundation for Toyota to be successful, though it is one of the most difficult concepts to understand and put in place when undergoing a Lean implementation outside of Toyota. The same is true in health care: employees are experts in their work areas and their involvement, professional knowledge, experience, and skills are crucial in any effort to improve a health care organization, making it vital that the health care staff be involved in and drive the Lean activity (Poksinska, 2010). In health care, examples seem to illustrate that direct involvement by those doing the work seems to increase buy-in and engagement in the Lean process and make team members more accepting of Lean, allowing for more success when Lean tools are implemented. In one study, it was found that the direct involvement of a surgical team in a Lean project led to those team members justifying the need for Lean and the need for improvement, so much so that their engagement and embrace of Lean concepts and activities was shocking to

those observing (Waring and Bishop, 2010). Other studies have shown that results of Lean efforts were greater when frontline workers actively participate in Lean process improvements, and metric improvements are shown most when frontline staff that performs the work are involved in and own the Lean efforts (Dickson et al, 2009b). In summation, the successful transformation to Lean in health care is dependent upon the involvement of those doing the work and the understanding and application of Lean principles and techniques within the staff (Poksinska, 2010).

1.2.5 Lean Tools and Health Care Applications

Many of the Lean tools that are utilized in health care are aimed at eliminating waste, though it should be noted that tool-based implementation may lead to initial gains and quick wins but is unsustainable without staff engagement (Radnor et al, 2012). Ohno's seven wastes, as discussed earlier, also have application in health care. Health care examples of Ohno's seven wastes are shown in Table 1.4 (Steed, 2012, Belter et al, 2012, Radnor et al, 2012, O'Neill et al, 2011). In addition to Ohno's seven wastes, the often utilized eighth waste of underutilized intellect is important to consider in health care (Poole et al, 2010).

Table 1.4: The seven wastes as applied to health care.

1. Waiting	• Excessive wait times for patients • Service delays • Staff waiting for information (i.e. lab results) • Room turnover • Patient discharges
2. Overproduction	• Providing more than the next operation needs • Just-in-case lab tests • Referrals made too early
3. Defects/Rework	• Hospital acquired infections • Surgical/procedural errors • Additional work caused by these errors • Patient readmission • Repeating tests because information was invalid • Medication errors
4. Motion	• Movement of the caregiver long distances to see patients • Searching for supplies or basic equipment not stocked in patient room • Walking between units • Looking for paperwork
5. Over-Processing	• Providing more service than needed • Redundant efforts between physicians • Redundant charting
6. Inventory	• Excess supplies in supply rooms • Excessive patients in process waiting for procedures • Patients waiting to be discharged • Waiting lists
7. Transportation	• Movement of the patient between floors or units • Movement of drugs between the pharmacy and the units • Central equipment storage instead of on-site location

The most common Lean tools utilized to eliminate these wastes in health care include value stream maps, standardized work, gemba walks, 5S, continuous flow, waste reduction, pull, kanban, changeover reduction, and visual control, among others (Poksinska, 2010, Belter et al, 2012, Poole et al, 2010). When implemented, these tools

must be used in conjunction with a strong Lean culture that utilizes those doing the work to help drive improvements in order to be successful and show results.

1.3 Enterprise Lean Transformation

1.3.1 Issues and Roadblocks that Hinder Lean Transformation

As if the rigor and persistence required to successfully complete a Lean transformation is not enough, there are many challenges, roadblocks, and errors that occur during Lean transformation efforts that can make successful transformations nearly impossible. The Lean Systems Program at the University of Kentucky identifies several derailer modes that can and do hinder the progress of a Lean transformation. These derailer modes include: not understanding the destination of the Lean journey, upper management not realizing they are responsible for changing the culture of the company, rushing to kaizen or improvement efforts without first establishing standardization, acceleration of the transformation process, a lack of focus on building role thinking within the organization, a lack of understanding of how Lean looks outside of a production area, attempting to transform a company to Lean simply through presentations and teaching, and not establishing a management hand-over system to retain and develop the Lean system (True Lean Systems Program).

Furthermore, issues arise from implementation strategies. When implementing Lean, efforts can fail if they are not consistent with the culture of the organization or if they are implemented in one level of the company and then ignored everywhere else (Marksberry et al, 2010). Picking and choosing elements of Lean to implement could even have a negative effect on the overall performance of the company (Allen, 1995). Also, failure can occur when Lean and TPS are misinterpreted by those implementing it

(Marksberry et al, 2011). The chances of success are not good when Lean is implemented as a top down approach to reduce costs and improve performance (Poksinska, 2010). A failure to properly implement Lean leads to unsuccessful outcomes and unachieved goals (Dickson et al, 2009b).

Another major contributor to failed Lean efforts, as mentioned, is utilizing a tools-only approach for implementation. For many companies attempting to implement Lean, the obvious solution has been to learn the tools used by Toyota and implement them as well as possible, but this strategy is flawed because it does not create the culture that developed those tools and techniques in the first place, as the Toyota philosophy shows that equal emphasis must be put on the hard- and soft-sides of Lean in order to sustain improvements (Badurdeen et al, 2010a). When focusing on the emulation of Toyota's Lean tools, it is difficult to sustain improvements, let alone the use of the tools themselves (Yamamoto and Bellgran, 2010). Without first building culture before implementing Lean tools, any results or improvements associated with the tools will prove meaningless and will not result in improved performance (Parks, 2002, Yang et al, 2012).

1.3.2 Planning a Lean Transformation

When undertaking a Lean transformation, it should not be expected that change will be realized quickly throughout the enterprise. Many who have participated in Lean transformation efforts have referred to the fact that the implementation moved too quickly, and, if things could be redone, they would have slowed the pace of implementation to ensure that a good foundation was laid before moving forward (Steed, 2012). Developing Lean is a trying process and takes discipline and time to complete

(Parks, 2002). Especially in large companies, it takes time to change all segments of culture and product delivery system (Greenwood et al, 2002). Furthermore, studies show that results and performance depend on time since implementation, getting better as time goes on (Yang et al, 2012). All in all, it has taken Toyota over 60 years to implement the culture that it has today, which enables the sustained success associated with their production system (Ohno, 1988).

Once realistic expectations are set for a transformation timetable, planning must begin for undertaking the transformation. Strategic planning must be one of the first steps when considering a Lean transformation and consists of specifying why the decision has been made to adopt Lean and what general actions will need to be taken going forward (Mathaisel, 2005). This planning also addresses the goals of the transformation, and, in the case of Virginia Mason Medical Center, is more than words. Virginia Mason Medical Center created a graphic to illustrate their strategic plan, as shown below in Figure 1.4 (IHI, 2005).

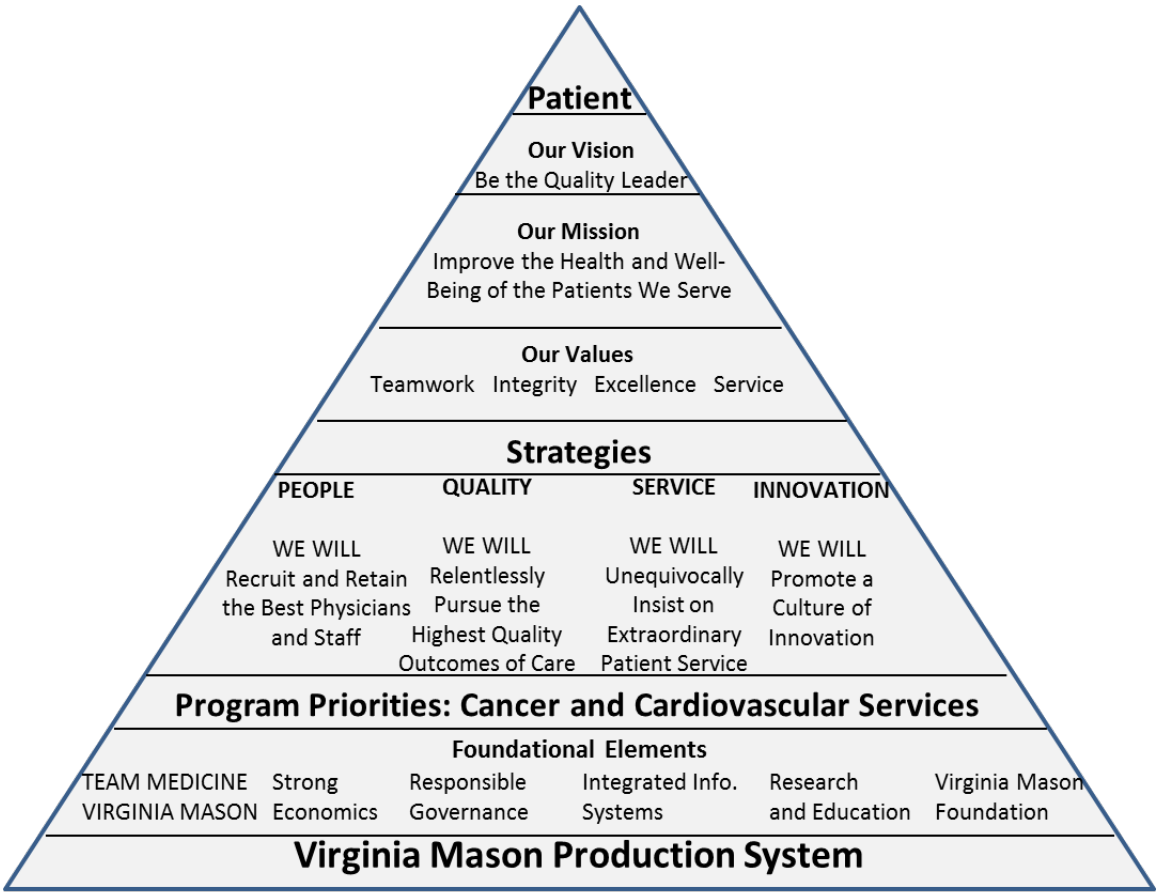


Figure 1.4: Virginia Mason Medical Center Strategic Plan.

Development during the planning phase should be based on a clear understanding of the group's effects on and contributions to the company's goals and targets. One element that is essential in the planning phase is having clearly articulated enterprise goals and metrics that provide a foundation for moving forward with the Lean implementation (Mathaisel, 2005). Planning should also include identification of the product and the customer, clarification of roles, a strategy to put a Lean culture in place throughout the entire company, and development of key performance indicators for the company to measure itself against throughout the transformation (True Lean Systems Program). Planning and detailed documentation of the plan are crucially important moving forward, as changes in leadership do occur and, without proper documentation,

can lead to a loss in momentum or a total derailment from the strategy that was initially set in place by the organization.

1.3.3 Building Culture and Creating Buy-In for a Lean Transformation

One of the first challenges in implementing Lean is building acceptance for Lean, as many companies have difficulty spreading lean awareness throughout (Greenwood et al, 2002). A concern that prevents buy-in throughout an organization involves fear that, if implemented, Lean improvements will lead to lay-offs. Staff commitment and engagement in Lean work can be associated with a fear of improving themselves out of a job (Johnson et al, 2012). Security and trust must be established so that employees can participate and buy-in to Lean initiatives without fear of losing their jobs, as people will continue to reject change that is not in line with their needs or if it is used as a justification for reducing the number of employees (Allen, 1995).

Furthermore, staff satisfaction should be used as a motivational force to encourage the change and create buy-in (Dickson et al, 2009b). Emphasizing worker empowerment and involvement may make creating buy-in easier, as people tend to accept change when they can experiment with it by themselves (Parks, 2002, Yamamoto and Bellgran, 2010). Furthermore, buy-in can be created by using a comprehensive communication strategy to demonstrate how Lean can improve worker morale and satisfaction (Greenwood et al, 2002). Some companies even go so far as to offer compensation tied to participation in Lean activities so that people feel a sense of investment in the Lean transformation (IHI, 2005).

It seems, however, that building a Lean culture and fostering employee involvement is the best way to create buy-in for a Lean transformation and lay the

foundation for success moving forward. Nevertheless, the ideal culture for deploying a successful Lean transformation is not easily defined and many companies fail to succeed in the area of culture transformation and neglect the critical role of culture in the implementation of TPS (Badurdeen et al, 2010a, Yamamoto and Bellgran, 2010, Yang et al, 2012). It is estimated that 70% of Lean transformation efforts fail due to a misunderstanding of the culture that must be established and how people throughout the organization are going to deal with the change to a Lean environment (Badurdeen et al, 2010b).

An organization's culture can have a paramount impact on that organization's effectiveness when aligned with the organization's goals and can be a positive or negative force for the company moving forward; though changing a corporate culture is not an easy task (Roberts and Rollins, 1996). The alignment of the culture and goals in a Lean transformation is essential to the success of the transformation. Culture consists of the attitudes and beliefs that determine how individuals behave (Allen). The Lean culture must embrace the values, roles, and behaviors that are in line with the organization's goals, keeping the customer in mind as the driving force and striving for a state of continuous improvement (Badurdeen et al, 2010b). It must be based on an appreciation of human activities including respect for people, job security, empowerment, the pursuit of perfection, and the sharing of success, and employees should be motivated to suggest improvements (Yang et al, 2012). The Lean culture must nurture citizenship, which allows all individuals to support the organization while performing their jobs and doing their best to make the company more successful while always being heard regarding the issues that hinder their individual ability to be successful in their jobs (Allen, 1995).

It has been suggested that the key to changing to a Lean culture is creating small, quick wins to reinforce the credibility of Lean (Parks, 2002, Jenkins and Gisler, 2012). However, based on the principles of TPS, it is apparent that respecting the people who do the work and valuing their intellect is the key to a Lean culture. Utilizing ideas from frontline workers is the key to success of Lean, and staff more enthusiastically accept and deploy improvements that they were involved in, instead of being forced to institute top down process improvements (Dickson et al, 2009a). All employees must be challenged to enhance their jobs and suggestions for improvement must be implemented by those who made the suggestion (Allen, 1995). To grow this involvement, companies must move away from a culture of people-blaming to one that is blame-free (Greenwood et al, 2002). In order to foster the opinions and intellect of the employees, and encourage them to speak up when problems arise, cultures must be developed that do not assign blame to those who discover problems or associate asking for help as a sign of weakness, which encourages employees to conceal problems and mislead management, but rather develop a culture that encourages openness and honesty and does not assign blame but rewards those who reveal problems (Marksberry et al, 2010). Employees will feel motivated when they can contribute their ideas and recognize that they have the support of management (Marksberry et al, 2011).

1.3.4 Lean Implementation Strategies

When undertaking a Lean transformation, companies must utilize an aggressive architecture for the transformation of the enterprise and should follow a process that leads from conceptual and preliminary design of the implementation strategy through implementation and operation (Mathaisel, 2005). The Enterprise Transformation Roadmap, developed by MIT, suggests a three-staged transformation process: a strategic

cycle where the organization establishes the need for change and obtains leadership commitment, a planning cycle where visions, goals, and plans for transformation are stated based on an analysis of the current performance of the organization, and an execution cycle where the transformation plan and projects are implemented (Abdimomunova and Valerdi, 2010). Furthermore, the MIT approach lists seven principles of transformation, including (Lewis, 2012):

1. Adopt a holistic approach to enterprise transformation
2. Secure leadership commitment to drive and institutionalize enterprise behaviors
3. Identify relevant stakeholders and determine their value positions
4. Focus on enterprise effectiveness before efficiency
5. Address external and internal enterprise dependencies
6. Ensure stability and flow within and across the enterprise
7. Emphasize organizational learning

In another model, Steed (2012) describes the ideal deployment strategy, especially in a hospital environment, as on that consists of a readiness check, a change and accountable-leadership structure, a learning system, a best practice tool and tacit deployment, and continuous improvement and sustainment, as illustrated in Figure 1.5.

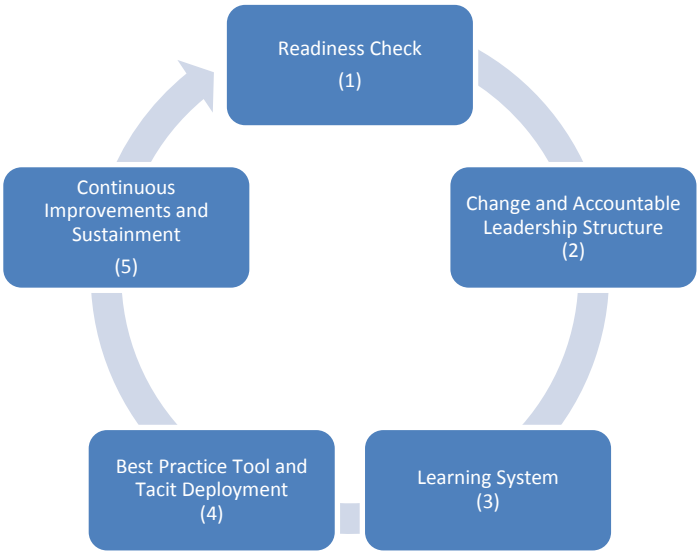


Figure 1.5: Adaptable Lean Leadership Model.

Though these methods of Lean transformation are well-known and popular in many industries, they seem to fall short on one of the main pillars of TPS: culture. For this reason, a more people-oriented approach is desired for implementation. The University of Kentucky Lean Systems Program's "Path to True Lean" focuses first on the development of a culture conducive to Lean and then on the implementation of tools to achieve improvement (True Lean Systems Program). The Lean Systems Program identifies three types of Lean transformations, as outlined in Table 1.5.

Table 1.5: Types of Lean Transformations.

Type I Transformation	• These transformations are intended for the opening of new facilities within Toyota, such as the opening of Toyota Motor Manufacturing Kentucky • These transformations involve completely overhauling the organizational culture by importing experts from organizations immersed in TPS
Type II Transformation	• These transformations are intended for transforming a Toyota supplier to Lean • These transformations involve utilizing consultant experts from Toyota to assist, teach, and apply TPS
Type III Transformation	• These transformations are intended for companies outside of Toyota and their suppliers • These transformations utilize Lean experts as consultants to coach leadership through the implementation and involve developing a model area to teach and grow TPS throughout the facility

The True Lean strategy was created by Toyota executives in residence at the University of Kentucky to oversee the Lean Systems Program. This strategy focuses on building a role-driven, procedure-focused culture where team members are involved in improving their environment as opposed to a more results-focused environment where problems are delegated from above and employees have little control over their work environment. A cultural shift must take place, moving from an environment where the personal preference of the boss dominates the focus of the company to one where an impartial and unbiased view of the principle and philosophy based thinking of the TPS house guides the focus. Commitment must be generated at all levels of the organization in order to move forward and make Lean transformation successful. Figure 1.6 outlines how a Type III transformation would take place (True Lean Systems Program).

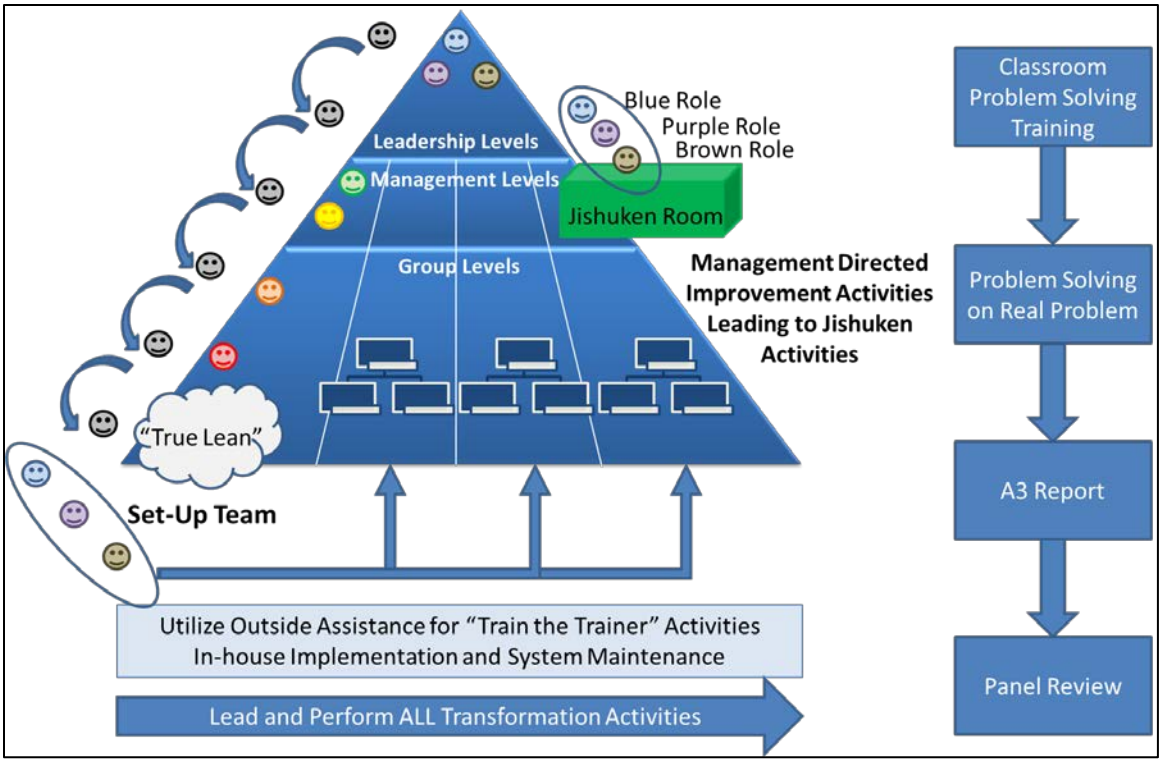


Figure 1.6: "True Lean" Implementation Strategy Image.

The True Lean implementation plan will be the method of focus for the remainder of this paper and was the observed method in this case study. The True Lean transformation strategy involves the following:

- Executive leadership training as the first step to familiarize the highest company leadership with Lean philosophies and practices and demonstrate the value of applying Lean in the organization
- Development of a strategy and plan on paper to demonstrate the culture-building activities and implementation steps for moving forward and identify checkpoints to assure that the transformation is on track in the future

- Leadership development so that department level leadership understands the Lean principles and philosophies and can design and deploy a lean transformation strategy
- Roll-out of Toyota style 8-Step Problem Solving Method, which builds the culture of continuous improvement and is the backbone of Toyota's improvement efforts
- Jishuken room development for management training in Lean methods and facilitation of management-initiated problem solving activities
- Development of One Voice, One System materials to ensure the Lean message and company philosophy are consistent throughout the transformation and the enterprise
- True Lean Support and procedural adjustments to lay the foundation for the transformation moving forward
- Model area development, where transformation efforts will be focused and grown, and where other departments can come to learn about the implementation process and see the Lean transformation in action
- Expansion of Lean efforts from the model area throughout the enterprise

This method relies on the ability to build standards from the current situation, establish an organizational structure that can support these standards, and work to improve these standards through 8-Step Problem Solving in order to improve operations. When establishing standards, the Check-Act Cycle is recommended. In this method, the organization must check the current situation in order to gain a full understanding of the current conditions and then act to create standards based on the current situation while eliminating causes of waste and variation. Moving forward, the organization can use this

cycle, along with 8-Step Problem Solving, to make operational improvements. The Check-Act Cycle is shown in Figure 1.7.

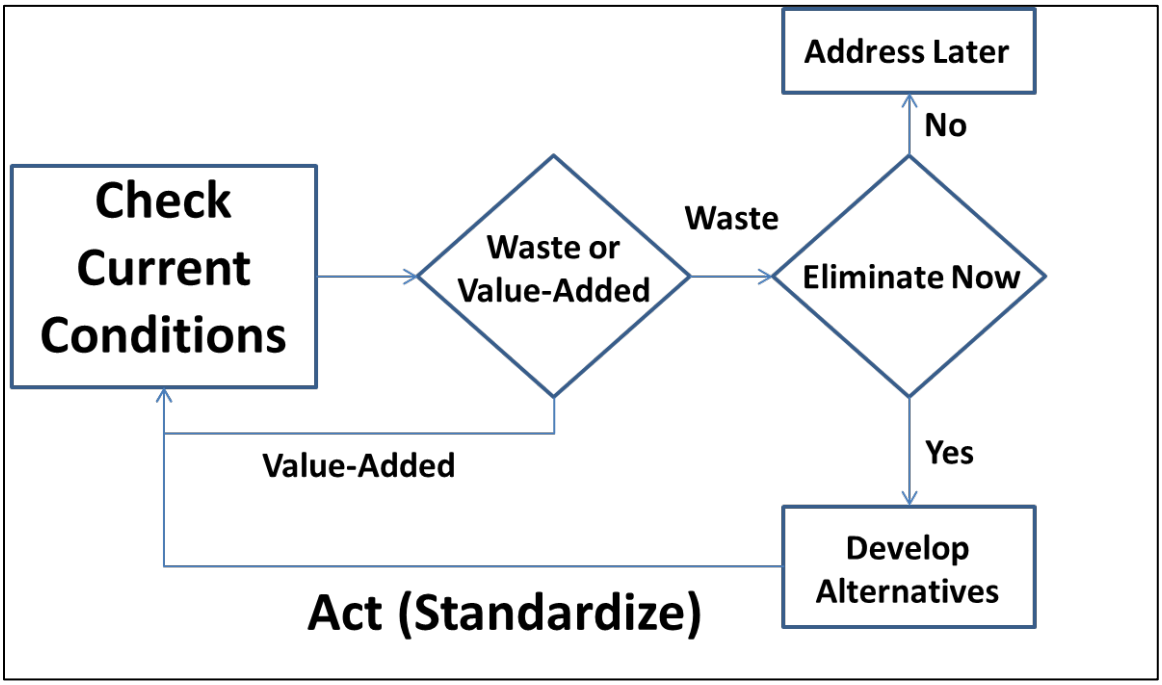


Figure 1.7: Check-Act Cycle for stability and standardization.

2: BACKGROUND

Throughout this case study, fictitious names will be used as company names and team member names cannot be disclosed. HealthCo, the subject of this case study, is a large teaching health care organization that supports medical, dental, nursing, public health, health sciences, and pharmacy colleges, students, and patient care activities. HealthCo employs over 6,000 people throughout the entire corporation and, beyond its main facilities, contains over 200 other clinics and outreach programs. HealthCo has been nationally acclaimed by several award agencies and has recently seen growth in the size of its facilities.

HealthCo leadership moved to implement Lean in January 2012 amidst growing pressure on the health care industry to increase quality, safety, and efficiency performance while lowering operating costs and fees to be paid by patients, third-party payers, and government agencies. To assist in their Lean transformation efforts, HealthCo enlisted the help of a consulting firm to assist with the planning and implementation of the Lean transformation efforts. This case study is a documentation of the Lean implementation strategies and progress as experienced by HealthCo.

3: METHODOLOGY

The findings of this paper are identified from a case study of an ongoing Lean enterprise transformation at a major learning health care institution in the United States, hereby called HealthCo. The Lean transformation at HealthCo was directly observed by the author of this paper, as the author was involved directly in the transformation process and has logged approximately 700 hours of direct observational time in an effort to fully and accurately document the strategies and progress made in Lean transformation. Participation in the transformation began on February 27, 2012, during the planning phase and shortly after the decision was made to undertake an enterprise Lean transformation. The period of participation was from February 2012 to the current time, March 2013. The author assisted with a consulting agency and HealthCo to relay information and document progress in transformation. The author's main purpose was to document the transformation as it occurred with no bias associated with either party. Observational data was collected in a variety of ways. These methods for observational data collection are outlined as follows:

- Participation in transformation meetings with leadership in which transformation plans, strategies, and actions were discussed and put in action
- Participation in Jishuken Room development and Jishuken Room activities
- Participation in model area development and model area management meetings
- Participation in 8-Step Problem Solving training, involvement and facilitation of 8-Step Problem Solving groups, and presence at management report-outs for 8-Step Problem Solving teams
- Participation in management-led problem solving activities

- Participation in the development of enterprise Lean training materials and simulations
- Discussions with company leadership, management, and front-line staff workers throughout the transformation
- Discussions with former Toyota employees and the Lean consulting group to understand the thinking and behaviors associated with the Lean transformation method that was utilized

Collected data and notes were carefully documented and reviewed to ensure that all details of transformation activities at HealthCo were understood and accounted for. Though directly involved in many activities within the transformation, since the author's position was first and foremost to document the strategies and progress in Lean transformation at HealthCo, the transformation was able to be observed with the perspective of an outside party, thereby alleviating any concerns for bias.

Upon consolidation of all observational data, findings were analyzed based on progress made in developing a strategy for the company to proceed with implementing Lean, leadership development and involvement to be conducive to a Lean environment, management-led projects and activities, team member education, model area development, and culture development, as compared to the initial goals established by HealthCo during the onset of transformation.

4: FINDINGS

The following section describes the methods in Lean transformation that were observed at HealthCo during the first year of transformation efforts. The HealthCo implementation strategy involved three main activities: model area development, 8-Step Problem Solving training, and management-led problem solving activities. These cornerstone activities, along with the decision to implement Lean and leadership's role in the transformation will be discussed in depth. Analysis made based on these results and findings from the observational data will be addressed in Chapter 5.

4.1 The Decision to Implement Lean and the Role of Leadership in Transformation

4.1.1 The Need for Change

One thing that drives organizational change, especially toward Lean transformation, is a shared reason to change, also known as a burning platform (Steed, 2012). This burning platform presents a need for change within an organization. This need for change often arises in response to opportunities or threats in the organization's market or as an opportunity to create a competitive advantage or overcome a crisis (Abdimomunova and Valerdi, 2010). In fact, it has been suggested that one method of exciting organizational change is to create a situation where there is no choice but to feel the need for improvement (Yamamoto and Bellgran, 2010). In the ever changing environment of today's business world, those companies who do not move to develop a Lean organization will lose out to competition, and in some cases, ultimately go out of business (Parks, 2002).

The development and improvement of an organization is driven by a conscious effort to achieve the next level of need that the organization faces (Allen, 1995). The

transformation of Toyota into the system that it is today was driven by need. Post WWII, Japanese manufacturers were faced with the challenge of cutting costs while producing small quantities of small types of cars, which was dissimilar from the popular mass production methodologies of the day (Ohno, 1988). It was the need to meet this varying demand while cutting costs that fueled Toyota's improvements. For health care, however, different needs are driving a move towards process improvement, including rising costs, diminishing reimbursements, and safety and quality concerns (Steed, 2012).

At HealthCo, similar needs drove the transformation efforts. Driven by the Chief Medical Officer (CMO) of HealthCo at initiation of transformation, who will from here out be referred to as Green1 in accordance with roles to be discussed in a later section, it was recognized that the management team at HealthCo must improve outcomes by redesigning care processes and better utilizing its resources. The localized, disjointed method of providing care, in which care is delivered through a series of separated, professionalized activities, would not survive the pressures of lowering costs and increasing quality and safety. Instead, HealthCo leadership recognized that, as an organization, they must move to a care delivery system that relied on the coalescence of professional team member efforts that is built around the patient. A more integrated, more efficient health care system would need to be adopted in order to withstand the aggressive improvements that were demanded by patients and payers. In an effort to meet these demands and no longer continually add costs while delivering less than perfect care, HealthCo recognized the need, or burning platform, for organizational change. It was this need that inspired the transformation to Lean at HealthCo.

4.1.2 The Role of Leadership in Transformation and the Plan for Implementation

Ohno (1988) describes the leadership in an organization as being similar to coaches of a baseball team. Once the coaches of the team have taught their players how to master the plays of the game, the players can meet any situation with coordinated action in a manner that will achieve team goals. As in Ohno's metaphor, Lean managers must coach their team members on how to improve quality, flow, synchronization, and efficiency (Dickson et al, 2009a).

Leadership involvement is one of the most telling factors in a Lean transformation. It has been shown that when there is minimal leadership involvement, the success of Lean systems is limited, and the leadership involvement at the senior level is directly related to the commitment of a company's top-level executives (Steed, 2012). The support leaders throughout a Lean transformation can make the difference between success and failure. The strong commitment to Lean must start and be led by those at the very top of an organization and it is essential to the success of the change, eventually trickling down until all levels of the organization are involved in improving processes and reducing waste (IHI, 2005). Lean application is very fragile at the beginning, and without the support of top management, many obstacles will not be overcome, and positive results will not be sustained (Jenkins and Gisler, 2012). The commitment of leadership to Lean and to the necessary change is an important component of the culture that must exist for Lean to be successful (Dickson et al, 2009b). Especially in a health care system, leadership is the most important concept in a successful Lean implementation (Steed, 2012).

To reach success, there are certain traits and roles that are desirable for leadership to have during a transformation. Leaders must be able to empower their organization to act and to achieve the organization's mission and must be well respected (Johnson et al, 2012). In a hospital, especially, leadership must have a commitment to change, an ability to empower others, a high level of visibility, accountability for themselves and others, and dedication to continuous improvement (Steed, 2012). A top management team that clearly communicates their commitment to Lean is imperative for success (Parks, 2002). These traits enable those in leadership positions to fully fulfill their roles that are required for successful transformation.

In a successful transformation, Lean leaders must recognize that it is not their job to improve process, but to act as enablers and coaches for those doing the work to improve their own work (Badurdeen et al, 2010b). Leadership continually challenges workers to attain greater performance and creates an environment for workers to succeed by ensuring that the organization knows what behaviors are in line with company values and rewarding those behaviors (Allen, 1995).

The HealthCo transformation was driven by organizational leadership from the onset, specifically from the CMO, Green1, and the director of the quality and safety office, who will be referred to as Purple1 from here out. It should be noted, however, that while Green1 and Purple1 were in management positions at HealthCo, they were not members of the executive management team at the top level of the company, as the most successful transformations begin with a strong commitment to Lean from the top level of an enterprise. For illustration, a simplified organizational chart has been provided in Appendix A. Together, Green1 and Purple1 reached out to a consulting firm, which will

be referred to as LeanCo from here forward, for expertise and guidance in attempting transformation. This was similar to the path that ThedaCare, Inc. took during their transformation, as they consulted with a nearby manufacturing facility that had successfully implemented Lean (IHI, 2005). A partnership was developed with LeanCo, which was led by former Toyota executives and staffed with former Toyota employees, and collaboration began to kick off the Lean transformation at HealthCo. LeanCo's main purpose in the transformation would be to build the foundation of the TPS house as described in Chapter 1. In the initial stages of this collaboration, the development of timelines for transformation was discussed and draft plans were created with help from LeanCo. These plans for transformation will be discussed later in this section.

As part of the preparation, Green1 and Purple1 reached out to other members of management, encouraging them to join in on the efforts of Lean transformation. In doing this, the intent was to assemble the leadership team to spearhead the Lean efforts throughout the organization and be the supporting force for all transformation activities. Members of this transformation team, along with their roles, can be found in Table 4.4. To expand the knowledge and understanding of Lean within the transformation leadership team, it was recommended that each member attend a three week certification course offered by LeanCo. Because Lean philosophies, coaching, and guidance must be driven and communicated from top leadership in order to drive the change needed to be successful, it was essential that all members of the transformation team be well versed in Lean philosophies, methodologies, tools, and practices in order to ensure that one voice would be communicated throughout the enterprise regarding the Lean transformation. During this training, members of the leadership team were coached in the culture and

tools associated with Lean and TPS, instructed on Toyota's 8-Step Problem Solving Method and allowed to participate in problem solving activities, involved in hands-on manufacturing-based simulations to experience Lean tools and associated improvements first hand, and included in discussions with other industrial leaders on the challenges to implementing Lean and creating a cultural change that is conducive to Lean transformation.

After training was completed, and in conjunction with LeanCo, HealthCo's Lean management team began to initiate meetings to work out details for moving forward with the transformation. These meetings were set up on a bi-weekly basis starting in mid-February, 2012, and were intended to discuss strategies, vision statements, philosophies, timelines, and actions for moving forward with the transformation. The very first of these meetings laid out meeting guidelines, which were intended to guide all Lean leadership meetings moving forward, and eventually be spread as an enterprise standard for the way that meetings should be conducted. Though these were laid out in the initial meeting, they continued to be adjusted as needed to meet the goals of the team. These meeting rules and guidelines for transformation team meetings were listed as follows:

1. All meetings will be led by a designated facilitator.

2. Facilitator will be responsible for developing the meeting purpose/outcome and agenda, and distributing to team members at least one day prior to next meeting, using the standardized meeting agenda template.

3. All meetings will have a designated recorder who will summarize the meeting on the standardized meeting record template, and will distribute the notes to all team members within two days of the last meeting.

4. No meeting will be held without a clearly stated meeting purpose/outcome and agenda for that particular meeting.

5. The meeting agenda may be modified as needed at the beginning of each meeting, and may be modified during a meeting with the agreement of the team members present.

6. Other than the agreed upon modifications, the agenda will be adhered to by all team members to assure the meeting outcome is achieved.

7. Discussion and consensus will be the preferred decision making tool, with majority vote if consensus becomes too difficult and time consuming.

8. All members will treat each other with respect by being prompt in attendance, placing cell phones on silent, not interrupting others when they are speaking and not having “side-bar” conversations.

9. The HealthCo Lean staff will be the coaches on good process and lean thinking for designated HealthCo leaders.

10. The HealthCo leaders will be the implementation staff by engaging appropriate staff for carrying out the implementation steps and reporting to upper management and other work units.

11. The meeting will start and end on time.

As meetings progressed and guidelines were laid out for how meetings should be conducted within the Lean transformation team, strategies for transformation began to be discussed with team members and LeanCo representatives. As mentioned earlier, plans were already in development, as Green1, Purple1, and LeanCo consultants had been in discussion at the beginning of the consulting agreement, but discussion in the transformation team meetings gave an opportunity for all team members to discuss the details of the transformation and come to a consensus on details of the plan. In the end, it was decided that the plan would involve breaking the implementation down into small pieces, as opposed to an enterprise wide approach to implementation. This method was selected and preferred because it allowed focus in one area of the enterprise without adding the excessive burden and challenge of transforming the culture of the entire enterprise all at once. This plan involved three specific components, as outlined in Table 4.1.

Table 4.1: The three components of the HealthCo Lean implementation plan.

Component	Brief Description
Model Area Development in the Neonatal Intensive Care Unit (NICU)	The model area would be the focus of Lean implementation at the onset of transformation. After the model area was developed, Lean principles and philosophies would spread from there throughout the enterprise.
Education	This consists not only of educating management and staff on Lean principles and philosophies, but also of developing a curriculum for certifications and graduate degree courses.
Projects	This would include both management directed problem solving activities and problem solving activities at the shop floor level.

The plan for transformation also involved the following general tasks that are listed below, along with some associated sub-tasks:

- Executive Leadership buy-in and approval
- Jishuken Room development
- 8-Step Problem Solving training and roll-out
- Model area development
- Sequential roll-out throughout the enterprise

This general strategy is shown graphically in Figure 4.1, and a more detailed depiction can be found in Appendix B, and the main components of this plan, including Executive Leadership buy-in, Jishuken Room development, model area development, 8-Step Problem Solving training and education, and management-led problem solving activities will be discussed in greater detail in later sections.

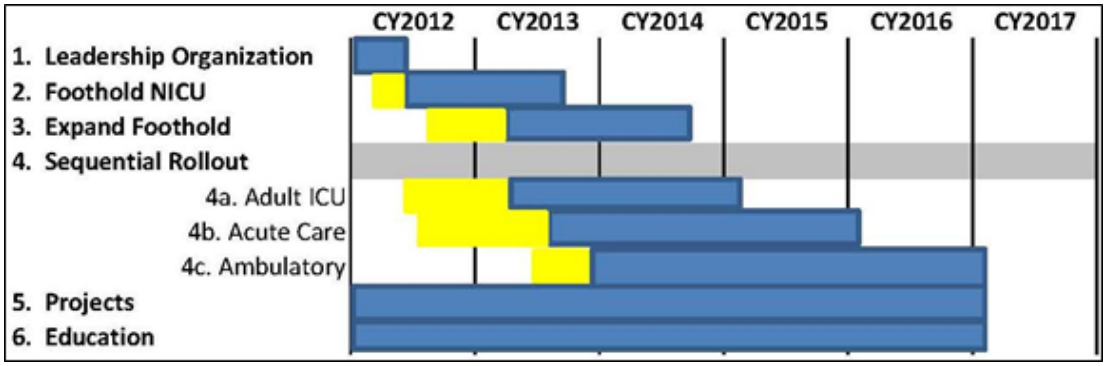


Figure 4.1: General strategy and timeline for HealthCo Lean implementation.

Because top level leadership commitment is so important to a successful transformation, it was necessary to involve the executive management team in the transformation, including the Chief Executive Officer (CEO) of HealthCo. Though Green1 and Purple1 had a preliminary vision for the path of the enterprise moving

forward, and a proposed strategy for the Lean transformation had been developed within the Lean transformation team and in conjunction with LeanCo, it was essential to get top level executive buy-in in order to obtain the resource allocation and commitment that was necessary to undertake the organizational change. In order to obtain this buy-in, a proposal was drafted to be sent from the Lean transformation team to the CEO, who will be referred to as Blue1 from here forward, and the rest of the executive leadership team. The proposal outlined the need for Lean, not only in HealthCo, but throughout health care, and demonstrated other examples of successful Lean deployments in health care, including at Virginia Mason Medical Center and ThedaCare, Inc. This paper described the plan as proposed by LeanCo, in which HealthCo would undergo a Type III transformation in order to become a Lean organization. In this Type III transformation, which would be guided by LeanCo, HealthCo would begin work in the neonatal intensive care unit to develop a model area and would grow Lean from there throughout the enterprise. This proposal also explained that no new funds would need to be allocated for the funding of LeanCo during the transformation, as all consulting costs would be covered by delaying the re-hire for a vacant position in the performance improvement department. Furthermore, the transformation team proposed that the Lean implementation be piloted for 12-24 months, at the end of which the progress would be reviewed and submitted back to senior leadership. At this point, the decision could be made to expand the model area to other clinical units or move in a different direction all together with the transformation.

In addition to this proposal submitted by the Lean transformation team, the executive leadership team was invited to attend Executive Leadership Training at

LeanCo. In this training, top-level leadership was presented with the basics of Lean, what would be needed going forward, and what benefits could be realized for the organization through a successful enterprise Lean transformation. After the proposal and training provided by LeanCo for the executive leadership team, Blue1, along with other top-level leaders, gave their approval for the transformation and bought in to the philosophies and practices of a Lean organization. This was a crucial and necessary step in moving forward with the transformation.

4.1.2 The Vision Statement for the HealthCo Transformation

In health care, it is critically important that value be defined by the primary customer: the patient. The needs of the patient must drive all processes and staff must come to understand that they work to provide value for the patients (IHI, 2005). Furthermore, the understanding of the customer and what they define as value must be understood in a standardized way throughout a Lean organization (Radnor et al, 2012). This understanding of value is necessary to be able to identify what is value-added and what is non-value-added in the customer's point of view, and, in health care, this means that the patients' definition of value must be taken into consideration when improving processes (Poksinska, 2010).

Beyond defining value for the organization, Lean leaders are responsible for creating a culture that is open to change by developing and implanting Lean philosophies into their organizations (Jenkins and Gisler, 2012). They must promote the benefits of Lean in order to involve others in changes (Waring and Bishop, 2010). In order to accomplish this, leadership must work to establish one voice for the Lean initiative throughout their enterprise.

Clearly communicating the goals and vision of the organization is a key to successful Lean transformation, and having an aligned vision and understanding of Lean throughout senior leadership and the enterprise is a critical foundation for implementation (Steed, 2012, IHI, 2005). A common language for enterprise transformation must be developed in order to reinforce principles and improve results (Abdimomunova and Valerdi, 2010). This common vision and language helps staff to embrace the promise of Lean and guides them to make the right choices (IHI, 2005). In health care, this common voice must link the problems of waste with staff concerns for patient care (Waring and Bishop, 2010). In order to establish a common voice for Lean and the goals of the organization when implementing Lean at Virginia Mason Medical Center, leaders were sent to Japan to immerse themselves in Lean principles and the Lean initiative was constantly referred to throughout the organization, posters were hung in visible places throughout the enterprise, and all work was linked back to the strategic plan of the company (IHI, 2005).

Leaders in Lean health care define value for the organization, work to identify issues that undermine this value, and enroll other clinicians into Lean thinking (Waring and Bishop, 2010). In order to accomplish this at HealthCo, the Lean transformation team had to do two things: establish and define value for the organization through the eyes of the patients and establish one voice for the organizations mission that could be standardized throughout and inspire staff to buy-in to the Lean movement. At HealthCo, defining value began with understanding what was important to the customer. Issues such as quality of care, patient safety, cost, and effectiveness of care were considered when developing the vision statement for the company. However, this vision statement

also had to inspire staff to buy-in to Lean and had to relate the patient, which matters most in the eyes of staff, to the goals of the company. In the end, the Lean transformation team developed the vision statement for HealthCo as follows:

"Through the guiding principles of:

- Patient Centered

- Highest Quality

- Safest

- Most Cost-Effective Care;

Fostered in an environment of:

- Teamwork

- Service

- And mutual respect;

Manage HealthCo to become a top ten* Academic Medical Center by 2017.

* Graded by UHC Quality and Accountability Study Methodology"

To accomplish this vision statement, the Lean transformation team also laid out an optimal management system for moving forward with the transformation; one that HealthCo would strive to attain moving forward. The ideal management system would make abnormalities safe and easy to grasp, use the 8-Step Problem Solving process to eliminate problems, and advance a continuous improvement culture by:

-Clarifying the best agreed upon practice

- Defining metrics for the essential Key Performance Indicators (KPIs) to measure progress toward the vision.

- Establishing visual management and visual control to continuously monitor KPI status to assure attainment of the master plan.

- Communicate, orient, and educate executives and transformation leaders on principles of HealthCo

In order to communicate the principles and philosophies of HealthCo, as recommended by the management system outlined above, the Lean transformation team sought to develop and define the principles and practices that would drive action throughout HealthCo that were in alignment with patient-centeredness and company values. To begin, the transformation team identified the philosophies, goals and desired outcomes for key participants, and pillars for the success of achieving patient-focused care. These items were arranged into a format similar to the TPS house, and are shown in Figure 4.2. The HealthCo house demonstrates that, as an organization, decisions should be made in consideration of the patients, employees, learners, and the company as a whole. Improvements must be based in standardization and perfect, just-in-time care must be achieved in order to realize a high-quality patient care environment where every patient is exposed to perfect care, every day.

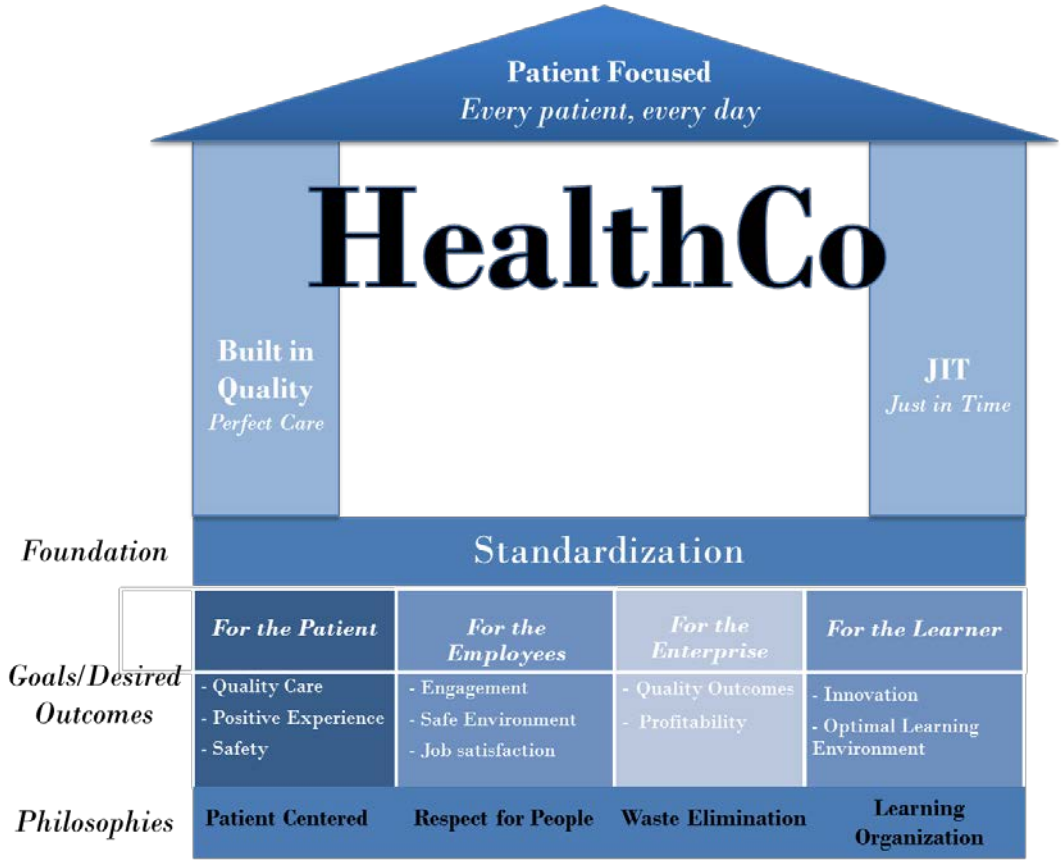


Figure 4.2: HealthCo House.

Furthermore, in an effort to more concretely establish one voice for change throughout the enterprise, the Lean transformation team outlined the philosophies and practices that would guide HealthCo to achieve their goals as an enterprise and achieve value through the eyes of the customer. These philosophies and practices are shown in Table 4.2.

Table 4.2: HealthCo Philosophies and Practices.

Philosophies	Practices
• Patient Centered = Every patient, every day • High Quality/Low Cost Value Proposition is attainable • Measurement is essential-Decisions will be predicated in data derived from the work • Inter-disciplinary, high velocity teams are critical success factors to a quality work product • The pursuit of perfect care starts with a foundation of standardization • Without the foundation of standardization, there can be no Kaizen • A transformational management system can be realized by executing our practices	• Standardization does begin with documentation of current methods (practice, protocol, procedure) as the first building block to discovery of perfect care • Repeatable processes are standardized and managed • 8 Step problem solving will be exercised with rigor and discipline to foster best decisions • Work will be primarily managed through the Jishuken Room • Active participation by all team members is essential • Active participation also includes going to "gemba" where value is created - We manage by facts and by seeing the work for ourselves. • Coaching will be accepted, encouraged and received in an effort to perfect our new disciplined approach • Priorities will be set for problem solving based on Value Proposition of High Quality/Low Cost Care • Agreement on data veracity will be done in Jishuken Room

Finally, in order to ensure that the Lean transformation and one voice materials, based on value in the eyes of the customer and company goals, would not be knocked off track, the Lean transformation team identified derailer modes that could potentially impede the progress of the implementation. These derailer modes are as follows:

- Upper management not realizing they are responsible to change HealthCo's culture

- Management trying to delegate their responsibility
- Rush to kaizen
- Lack of focus on standardization
- Lack of focus on building role thinking
- Attempt to 'PowerPoint' the company to lean

By identifying and defining value through the eyes of the patient, and by establishing one voice materials to drive change throughout the enterprise, the Lean transformation team had laid the groundwork for moving forward with the culture change that is so essential to success in a Lean transformation.

4.1.3 Measurement and Key Performance Indicators

In order for leadership to understand their progress in transformation, and their current ability to meet the needs of the patients in terms of value, it was essential to do some initial measurement and development of key performance indicators (KPIs). When developing an organizational culture, leadership must understand the level of readiness of the enterprise to achieve the required tasks, and it is important for leadership to conduct a self-assessment to understand the readiness of the workforce to embrace the changes in culture (Allen, 1995, Steed, 2012). Furthermore, benchmarking against internal operations or external competitors is a good way to measure the relative level of a company's Lean accomplishment, and some of these benchmarking measures can be associated with time, space, quality, people, and cost savings (Mathaisel, 2005).

HealthCo, like many major health care institutions, is already benchmarked and compared to similar medical centers by national accreditation organizations. Specifically, HealthCo as a whole is compared to over 100 other academic medical centers throughout the United States by UHC. Furthermore, the neonatal intensive care unit also utilizes Vermont Oxford network as a benchmarking and measurement tool to compare itself to other NICUs across the country. As these measurement and benchmarking organizations were already in place at the beginning of transformation, it made sense for the transformation team to select these as their benchmarking and measurement tools for overall progress in moving forward, though these measurement tools would not provide real time data for problem solving and issue identification that are essential to creating a Lean environment down the road.

After the baseline against which HealthCo would be measured throughout the process had been established, the next step for the leadership transformation team was to establish key performance indicators, or KPIs, to measure the performance and improvement of the organization throughout the transformation. When selecting KPIs, it was important for the transformation to keep the customer in mind, and specifically value as defined by the customer. For the patients, many things define value, including safe patient care, timely care, low-cost care, and a good overall experience. Furthermore, it is also important to consider benefits for the workers and organization when developing KPIs. The key performance indicators must be in-line with company goals and objectives and must provide a good representation of the progress that has been made while also making it evident when problems arise or when the enterprise falls short of

their goals and standards. With these facts in mind, the Lean transformation team developed the following KPIs:

1. The number of panel reviewed problem solving reports
2. The number of roles clarified with job instruction training
3. The number of tasks written as standard work documents
4. Monthly evaluation of standard work compliance (number of tasks monitored/number of times standard work followed correctly)
5. Patient satisfaction using Press-Ganey surveys
6. Employee satisfaction
7. Manager/leadership team satisfaction
8. Employee turnover (nurses, advanced practice providers, physicians)
9. Inpatient mortality rates and UHC O:E
10. Vermont Oxford composite performance
11. Length of stay (UHC O:E)
12. CLBSI (Central Line Associated Blood Stream Infection) rates
13. VAP (Ventilator Acquired Pneumonia) rates
14. Cost per case
15. Variable supply cost per case
16. Number of national presentations and publications on NICU care/management/education

These key performance indicators would be the standard upon which all progress is measured for the Lean transformation team when moving forward with the transformation.

4.1.4 Establishing Roles and Responsibilities

At Toyota, the organizational structure is such that normal work can be completed by those shop floor workers tasked with doing the work, while abnormal work is addressed by other parties in order to keep the flow of work moving. Furthermore, the organizational structure is crucial to problem identification, problem solving activities, and process improvement (Marksberry et al, 2011). A diagram showing the typical organizational structure for production at Toyota is show in Figure 4.3 (Marksberry et al, 2010, True Lean Systems Program).

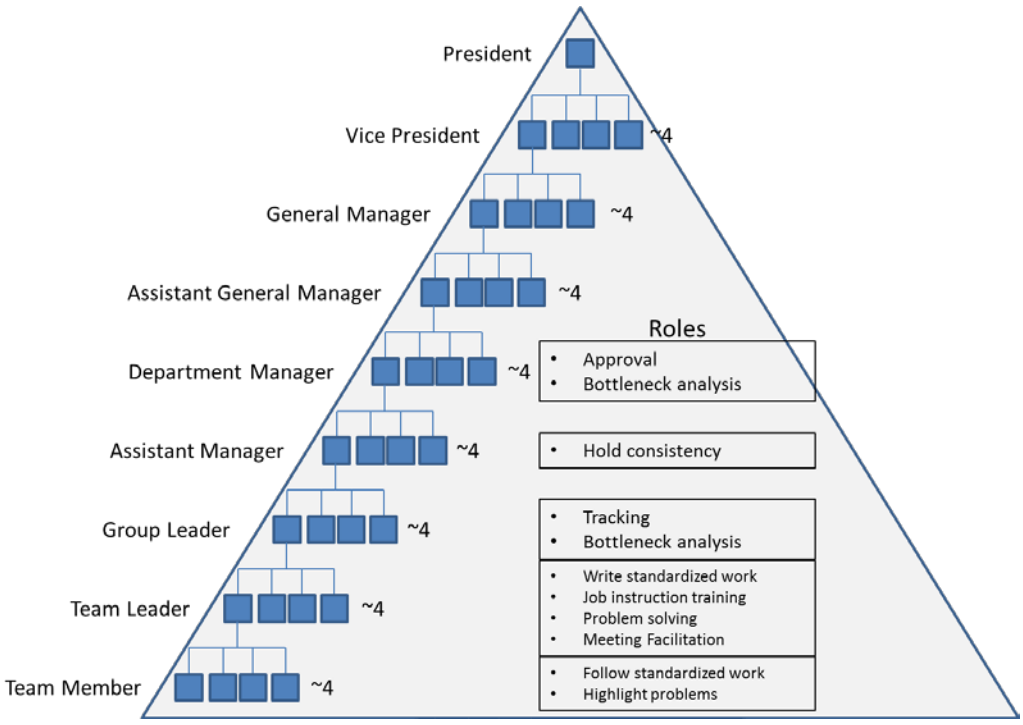


Figure 4.3: Organizational pyramid at Toyota.

Establishing roles and structure for the organization is crucial to the success of a Lean transformation. If roles are not specified, gaps in performance may exist with no one being able to assume responsibility for the entire enterprise (Mathaisel, 2005). In a Lean environment, roles are explicit, and it is the job of leadership to develop and explain

these roles and establish an environment that allows employees to fulfill their roles (IHI, 2005). In this new organizational structure of defined roles and responsibilities, leaders must coach and guide those who are below them and establish methods to achieve the goals and targets of the new Lean environment, rather than simply being directors or controllers, which may be a significant change from their previous roles (Badurdeen et al, 2010b, IHI, 2005).

In defining roles for the transformation, HealthCo worked with LeanCo to establish six roles that were necessary for a successful transformation. These roles are outlined in Table 4.3.

Table 4.3: HealthCo roles.

Role Name	Role Description
Blue	• Overall cultural transformation leader • Bring along the rest of the executive team • Jishuken room “owner” • Keeps focus on both results and process • Report Outs – How to “ Respond” • Target Setting (What, How good , When) • Decision Making • Resource Allocation
Green	• Report Outs – How to “Respond” • Target Setting (What, How Good, When) • Decision Making • Resource Allocation
Purple	• Developed expertise in 8 step problem solving and process flow analysis • Facilitates problem solving activity for management directed problems • Facilitates the discovery of the priority problems to attack through analysis and bottleneck discovery • Maintains the Jishuken room • Trains and develops staff from other units temporarily assigned to Jishuken room • Develop Metrics • Extract info from Data and Data Analysis
Brown	• Facilitates the problem solving activity undertaken by the Jishuken room (management directed priority) • Trains the 8 step problem solving process for the staff participating from the target unit • May be filled by “permanent” Jishuken room person or one of the unit’s rotational assigned staff • Process understanding • Metrics understanding • Facilitates development of Standard Work and Kaizen Activities
Yellow	• Staff from various units on a 6 month to 1 year rotation for supporting the Jishuken room and to learn the problem solving process and analysis tools to begin spreading the uniform cultural transformation • Staff from the targeted problem site unit to support and participate in the problem solving activity in their own work area
Orange	• Trainers to support the Blue and Purple roles to facilitate the cultural transformation process work by the HealthCo staff

Table 4.4 shows who filled each of the roles in the HealthCo transformation team and model area. The reference name for each person is listed in parentheses next to their job title, and this reference name will be how they are referred to throughout this paper.

Table 4.4: HealthCo roles by job title.

Role Name	Job Title (Reference Name)
Blue	• Chief Executive Officer (Blue1) • Executive Team
Green	• Chief Medical Officer (Green1) • Chief Nursing Executive (Green2) • Chief Administrative Officer (Green3) • Replacement Chief Medical Officer (Green4)
Purple	• Director of Quality and Safety (Purple1) • Lean Systems Manager (Purple2) • Process Improvement Coordinator (Purple3) • Lean Intern (Purple4) • Lean Intern (Purple5)
Brown	• Operations Director, NICU (Brown1) • Patient Care Manager, NICU (Brown2) • Lead Attending Physician, NICU (Brown3)
Yellow	• NICU team members performing work
Orange	• LeanCo staff member (Orange1) • LeanCo staff member (Orange2) • LeanCo staff member (Orange3) • LeanCo director (Orange4)

As mentioned previously in this section, Green1 and Purple1 spearheaded the transformation and took the lead role in transformation activities as described throughout this section. Other roles were established to support the transformation and begin to establish the culture that would be necessary to move forward with the Lean implementation.

4.1.5 Setbacks with Leadership

Though the leadership transformation team put much effort into planning the transformation and paving a road for success, several setbacks were encountered that could not have been anticipated at the onset of transformation. Setbacks occur in many transformations, and, depending on how they are dealt with, could result in failure of implementation.

The first major setback that was encountered involved the lead member of the transformation team, Green1. After developing the plan for implementation, getting buy-in from senior leadership, establishing a transformation team, and establishing transformation roles, Green1 accepted a position at another health care institution, leaving behind the Lean transformation at HealthCo. This change could have been catastrophic to the transformation. However, before leaving, Green1 handed over his duties as the lead of the transformation team to Green2, who was then tasked with continuing to lead the transformation activities and support the Lean implementation. Green2 was easily educated on all prevalent information through the transformation team and existing documentation about the Lean transformation. To ensure a common knowledge about Lean and ensure one voice for the transformation throughout the enterprise, Green2 also attended the Lean certification training at LeanCo.

The second unexpected setback occurred when HealthCo leadership was informed that they would be experiencing major budget cuts in the upcoming fiscal year. These budget cuts would take effect in July 2012, a crucial point in the transformation activities. As a result of these cuts, HealthCo was forced to lay-off staff across the enterprise. As discussed previously, lay-offs are very detrimental to progress in implementing Lean

because staff often already fears that if Lean is implemented, they may improve themselves out of a job. These lay-offs created a feeling of insecurity throughout the enterprise, which consequently sparked morale and trust issues within the staff. These morale issues were a serious impediment to the progress of the transformation, especially in the NICU model area. Further morale issues and setbacks in the model area will be discussed in a later chapter.

4.2 Jishuken Room Development

During transformation, it is useful for a project room to be allocated to showcase collective interests and activities related to the transformation and allow leadership to learn and communicate the transformation path through the display of posters that illustrate Lean principles, organizational goals, ongoing projects, and process and flow studies (Waring and Bishop, 2010, True Lean Systems Program). Figure 4.4 illustrates a Jishuken room layout for Lean transformation (True Lean Systems Program).

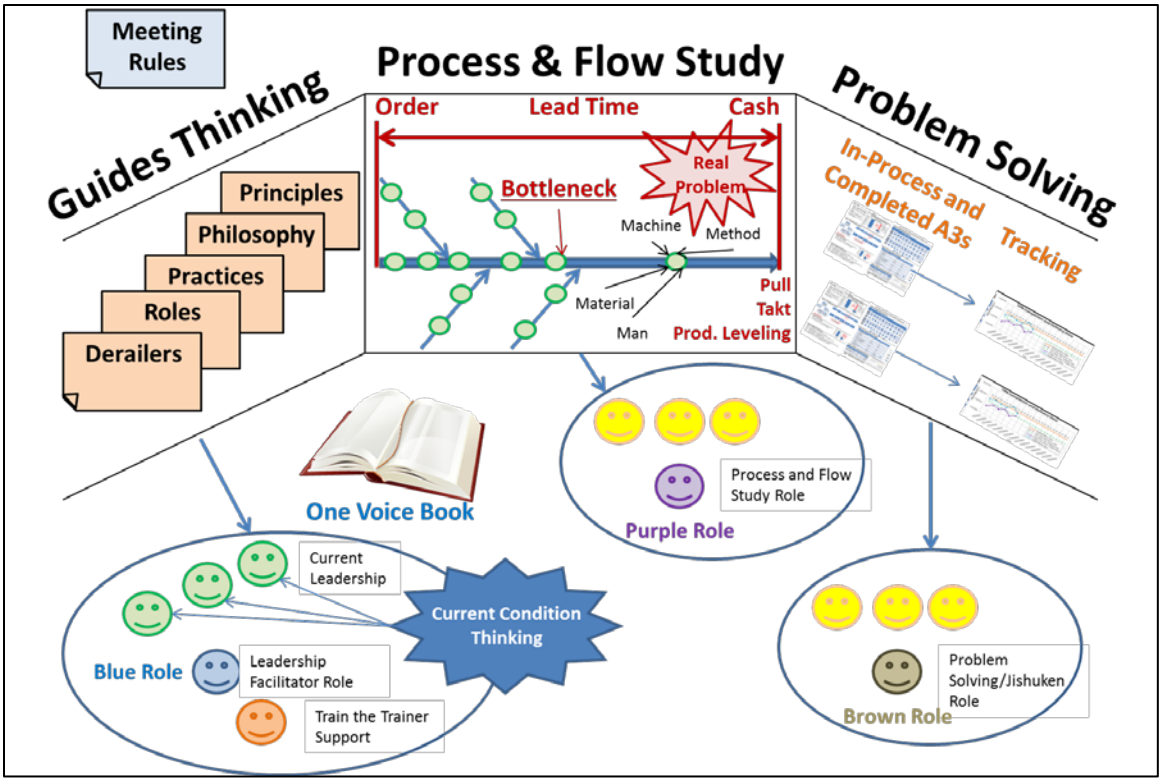


Figure 4.4: Jishuken room layout.

In transformation, the Jishuken room will house the transformation team meetings, and usually consists of four to six team members from various management levels (Marksberry et al, 2010). At Toyota, Jishuken rooms serve a purpose similar to this. Jishukens at Toyota seek to establish and organizational culture where people can feel comfortable asking for help and learning TPS and Lean principles, as well as serving the following purposes (Marksberry et al, 2010):

- Develop culture by establishing a common language for management related to Lean
- Develop and facilitate manager teams for problem solving throughout the enterprise
- Enrich and deepen the understanding of Lean by management

- Communicate and reinforce company values, behaviors, and beliefs
- Encourage continuous improvement
- Help a company tackle broad, enterprise-wide problems with cross-functional teams
- Monitor KPIs and company progress

For HealthCo, development of a Jishuken room was essential to moving forward with transformation. The Jishuken room would serve as a base for the transformation team where all meetings would be held and all decisions related to transformation would be agreed upon. The leadership transformation team at HealthCo defined the following purposes and guidelines for their Jishuken room:

- Assign selected unit staff on a rotational basis for training, education, and for spreading 8-Step Problem Solving to other areas
- Clearly define roles for the HealthCo Lean leaders and staff
- Clearly define the HealthCo strategy and plan, philosophy, principles, and practices leading to one voice for the entire operation
- Led and facilitated by key staff skilled in process analysis and problem solving

Beyond housing meetings for the transformation team, the Jishuken room at HealthCo also served to house meetings for management-led problem solving activities, which will be discussed in a later section, along with staff problem solving report-outs to leadership, 8-Step Problem Solving trainings, which will be discussed in a later section, and other Lean-related initiatives.

In order to demonstrate the progress of the transformation and establish the one voice materials that are necessary for culture building, HealthCo utilized the Jishuken

room to display all of the developed Lean culture material, including the HealthCo house, principles and philosophies, meeting rules, implementation timelines, and roles, along with ongoing problem solving reports, management-led problem solving activities, and NICU model area development. A diagram of the layout of the HealthCo Jishuken room is shown in Figure 4.5.

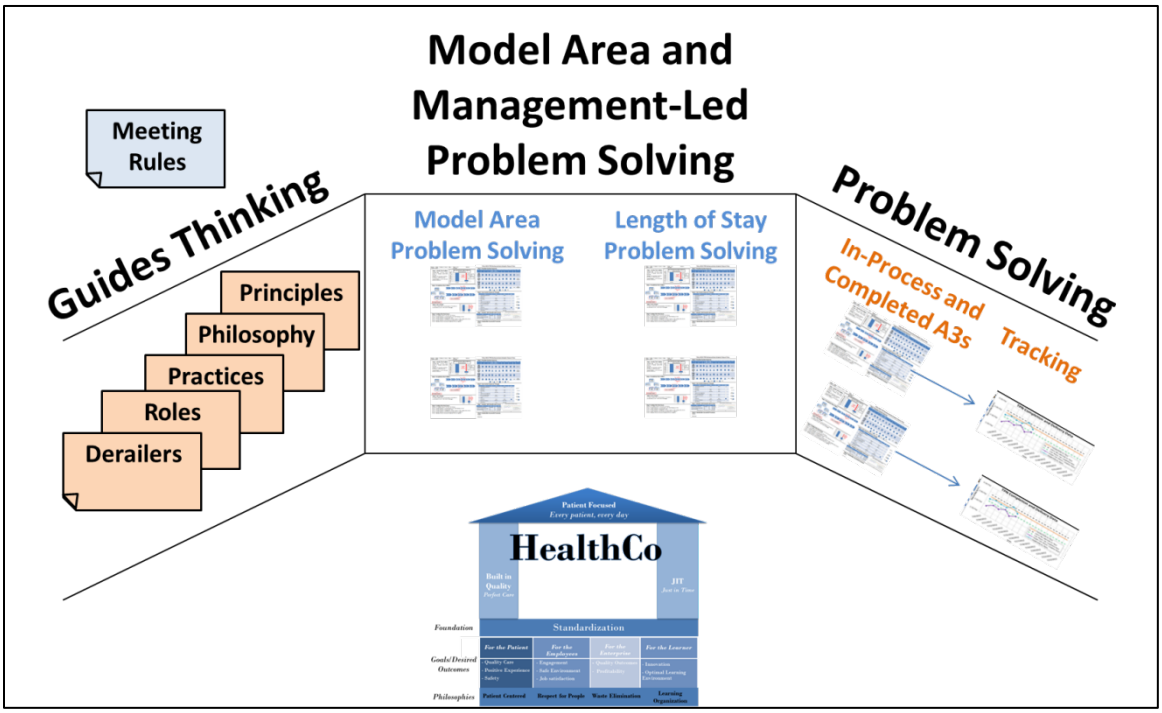


Figure 4.5: HealthCo Jishuken room layout.

4.3 Model Area Development

Though Lean should not be implemented as a piecemeal strategy where an organization's leadership selects only certain tools to implement to serve the company's needs, it is appropriate to implement Lean in a small area of the company, rolling it out only after it has been perfected in that specific area. Selecting a model area for implementation allows an organization to focus all efforts on one area during Lean transformation, places the responsibility of culture change on the leadership of the organization and of the model area, and significantly reduces the chances of Lean

leadership becoming spread too thin or becoming overburdened, which would inevitably lead to a failed implementation. A small-scale implementation is especially appealing in health care because health care organizations are usually very large and complex with many departmental, unit, and professional boundaries. During the establishment of the model area, it is important to have other projects and parallel activities intersect at some point to track progress and consistency and to associate learning opportunities with significant milestones in the model area.

As discussed previously, the HealthCo leadership and transformation team chose the NICU as the model area for Lean implementation. They recognized that the complexities of their organization, along with the departmental and professional boundaries that were present, made the small-scale model area implementation most feasible. In selecting the model area, most of the decision making process was completed by Green1, though the transformation team did participate in the process. The NICU was selected as the model area for the following reasons:

- Clear physical boundaries
- Clearly identifiable managers
- Staff members were team oriented and had an inclination for standardization and improvement
- Established baseline performance data

Managers that lead health care units implementing Lean need to actively support the improvement efforts and take ownership of the change (Poksinska, 2010). For this reason, it was vital to have members of the NICU leadership team involved in the transformation and decision making relating to the model area. To fill this role, Green1

appointed Brown3, who was the lead attending physician in the NICU, to lead the efforts of transformation in the model area. Furthermore, Orange1 and Orange2 would be contracted to assist with problem solving and model area development as seen fit by the Brown3 and the leadership transformation team. To start, Brown3 attended the Lean certification course at LeanCo in order to establish an understanding of Lean principles and tools. Brown3 was also a member of the Lean transformation team, which allowed all decisions regarding the model area to be agreed upon with a member of NICU leadership before moving forward.

Though Brown3 represented one major portion of the workforce in the NICU, the physicians, the leadership team did little to involve the nursing workforce in the process. Brown1 and Brown2, the operations director and patient care manager of the NICU, respectively, represented the nursing workforce, but were not involved in the decision to make the NICU the model area, nor were they trained in Lean principles and practices before the implementation began. In fact, Brown1 and Brown2 were not trained in Lean, nor included in the transformation meetings, until several months after the transformation had already began. By not including leadership from the NICU to represent all members of the workforce, the leadership team put the model area at the disadvantage of not having complete buy-in from the unit, which would be a key to the success of the model area. A general representation of the organizational chart as described for the NICU is shown in Figure 4.6.

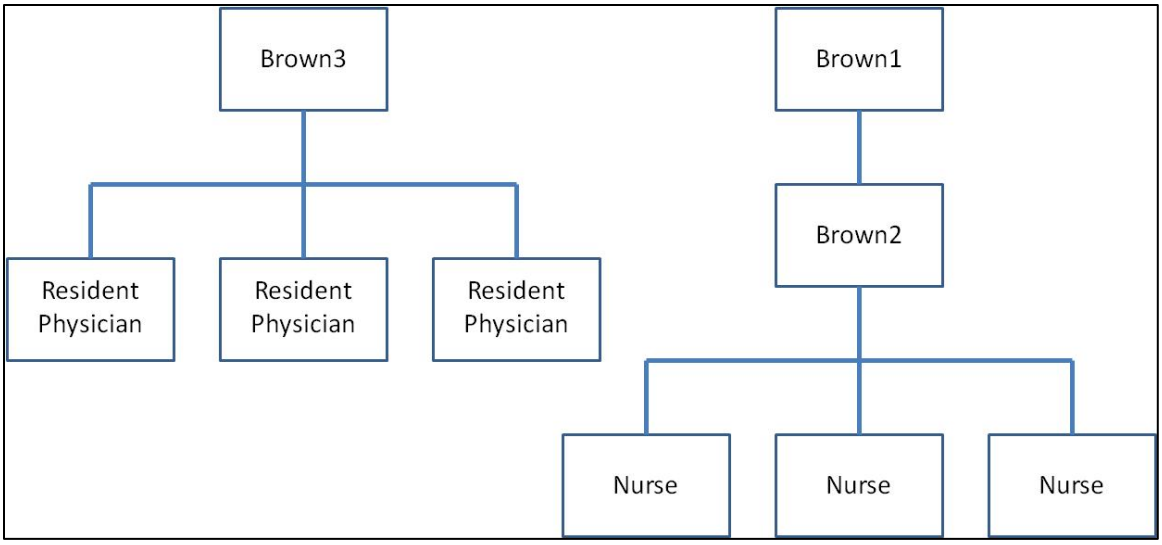


Figure 4.6: NICU leadership organizational chart.

Upon deciding to utilize the NICU as the model area, a plan was set in place to complete its development. This plan included gathering baseline metrics for performance data in the unit, completing process and flow studies to better understand how the unit worked and begin to establish points for improvement, and completion of three problem solving activities, which were to be led by Brown3. The overall goal for the development of the NICU was to create a model area that could demonstrate successful attainment of Lean implementation towards the HealthCo vision while attaining a high level of performance in the NICU and educating all levels of leadership and staff from other areas. After implementation in the NICU, Lean would be sequentially rolled out through other areas of the hospital, starting with the children's hospital, then the adult intensive care units, then all other adult units, and finally ending with ambulatory care units within two years, and showing self-sustainability within five years. The timeline for this implementation can be found in the overall timeline shown in Appendix B.

To determine where the unit was as a whole and outline the scope of the model area, it was first important to develop a packet of baseline information to describe the unit. Baseline information was gathered on the items shown in Table 4.5. In addition to these metrics, a floor layout of the NICU was also established, and organizational charts and staff schedules were to be understood. These baseline metrics would also serve as KPIs for the model area, which would drive projects moving forward and be used to measure progress made by the unit.

Table 4.5: Model area baseline metrics.

Category	Metric
Quality	• Mortality • Length of Stay
Safety	• Incident Reports • Employee Injuries • Patient Injuries
Efficiency	• Cost (% Labor and Non-Labor) • Discharges • Admissions
Satisfaction	• Patient Satisfaction Surveys • Employee Turnover

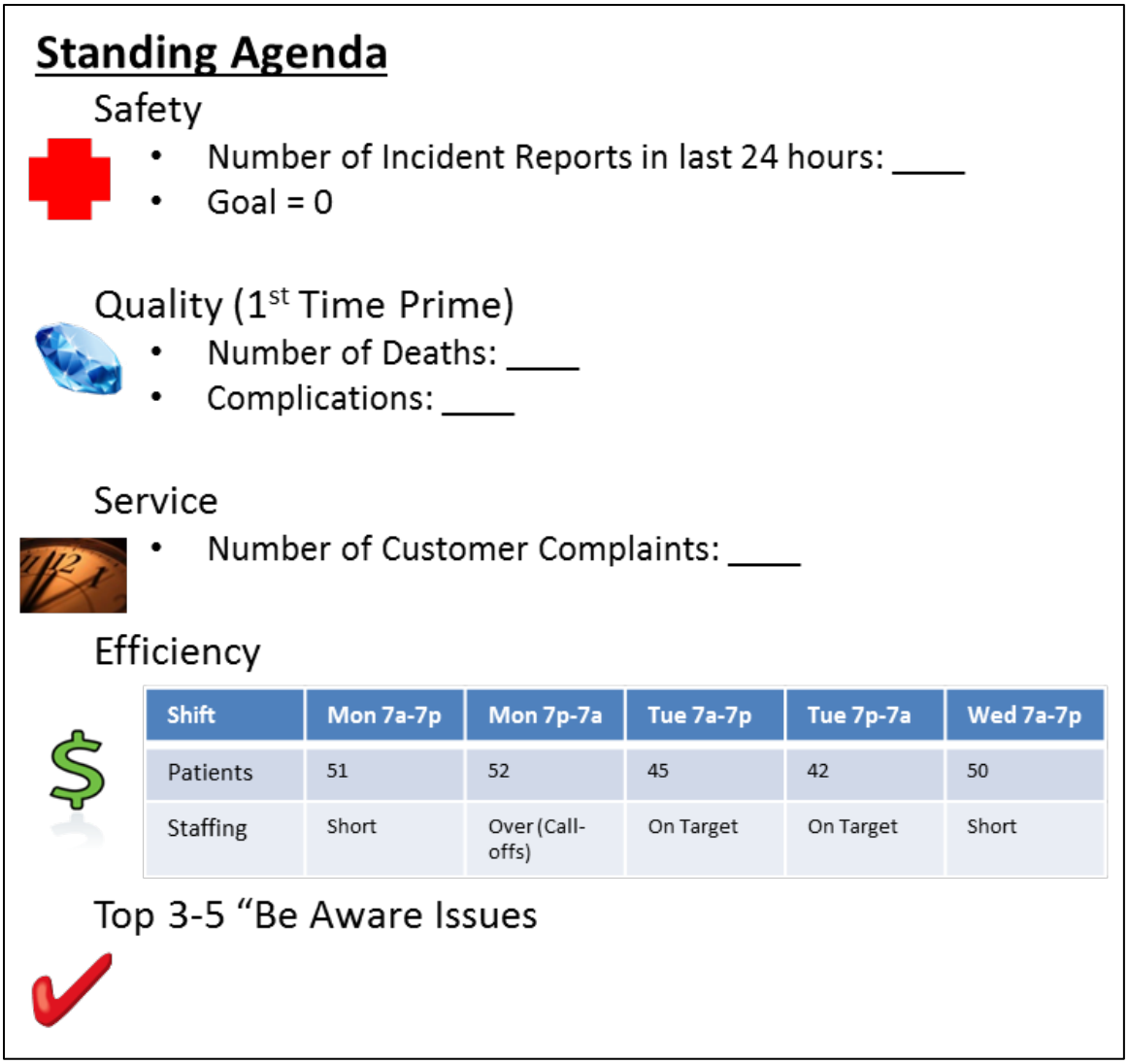
Staff education would also be an important part of model area development, as it would be vitally important for staff to have the knowledge and tools to be able to participate in problem solving activities and drive improvements in the unit. However, at the onset of model area development, there was little training of any staff members beyond that which was completed with Brown3. There was little to no knowledge of Lean principles in front-line staff, and, beyond that, nursing leadership had still not been included in the transformation plans, which meant that there was no nurse involvement in training for the transformation. The first floor level nurse was not trained in the 8-Step

Problem Solving Method until the end of June, 2012, which was several months after work had begun to develop the model area. Even after training began, there were very few others throughout the unit who attended training because of workforce constraints on the unit.

As the baseline information was being developed, four projects were also started in the NICU to address patient care issues, which is one more than planned at the onset of the model area development. The projects would address the following issues: improving code response, developing breast feeding protocol, eliminating unplanned extubations, and improving the process for giving chest x-rays. Brown3 took the lead on all of these projects and assembled teams to work through the 8-Step Problem Solving Method. However, because there was little Lean knowledge within the general staff population, and no nursing leadership buy-in or inclusion in the transformation, it was very difficult to find team members to participate in the problem solving. Furthermore, there were major issues with gathering data. A true lean system generates real-time data to keep workers informed of the status of their work and alert them when there is a problem, which enables problem solving and improvement activities. However, in the infant stages of development, such capabilities were non-existent in the model area. This meant that all data would have to be gathered manually, which takes time and effort beyond what was available from those who participated in the activities. This meant that a majority of the work associated with gathering data and completing the 8-Step Problem Solving Method for all four projects was placed on Brown3. Brown3 expressed much frustration during transformation meetings about the difficulty that was experienced with gathering data and getting participation from unit staff, even threatening to step down as

the Lean leader in the model area if things did not improve. Further analysis of why these issues occurred will be discussed in Chapter 5. Eventually, after completing much of the work and data gathering without assistance from others in the unit, Brown3 implemented countermeasures related to the projects. However, it was realized that there was little buy-in to the countermeasures and many of the improvements went unused, as there was no nurse buy-in or inclusion in the transformation efforts and Brown3 had no authority to tell the nurses how to improve their work.

Nursing leadership was finally involved in the transformation of the model area in July, 2012. Brown1 and Brown2 were sent to the same certification course at LeanCo that Brown3 had previously gone through, and gave their buy-in for the transformation efforts. After nursing leadership approved the transformation, Purple1 suggested that a daily huddle be implemented before each nursing shift to discuss how the unit performed on the previous day and to go over important metrics and KPIs for the units. These daily huddles were led by the charge nurse for each shift and were sometimes observed by Brown2, Purple1, Purple2, or Purple4. A standard format was developed for these huddles and can be found in Figure 4.7. However, there was much resistance to these huddles from floor nurses, as they saw little purpose in them and did not understand how they related to or improved their work or their ability to care for their patients. There was inconsistency in the performance of the huddles at first, and staff satisfaction with the huddles continued to be an issue throughout the implementation efforts.



Shift	Mon 7a-7p	Mon 7p-7a	Tue 7a-7p	Tue 7p-7a	Wed 7a-7p
Patients	51	52	45	42	50
Staffing	Short	Over (Call-offs)	On Target	On Target	Short

Figure 4.7: Standing agenda and format for model area nursing huddles.

The model area continued to be plagued with buy-in and participation issues. Little progress was made in culture development and with floor-level improvements. Eventually, because of a lack of progress in model area development, it was decided by the Lean transformation team to abandon the NICU as the model area and shift focus to another unit for model area development, though the new unit has not yet been identified. A further analysis of these issues associated with model area development will be discussed in Chapter 5.

4.4 Management-Led Problem Solving Activities

As discussed in a previous section, Jishuken rooms bring management teams together to identify and address problems throughout the enterprise, and often these problems cross department or area boundaries. Often, these problems are identified when there is a discrepancy between a KPI or a standard and the current situation of operations. When initiating a management-led or Jishuken problem solving team, there are three main components to completion: identification of the problem, formation of the problem solving Jishuken team, and completion of the 8-Step Problem Solving Method, which will be discussed in greater detail in a later section (Marksberry et al, 2010).

At HealthCo, the leadership team established that, as they see a problem arise in the organization, the Jishuken room will be used to prioritize them, solve them, and spread the concepts developed while solving the problems. Projects would be completed based on the overall goals and priorities of the company. These goals and priorities would be communicated downward from management, along with data, to drive improvement efforts. After this communication, individual departments can decide what they need to do to achieve the improvement in their areas.

One of the first of these projects to arise was associated with patient length of stay. Patient length of stay is the ratio of the observed time that a patient spends under hospital care as compared with the expected time for care based on benchmarking with other hospitals throughout the country, with a number equal to one meaning that the observed patient length of stay was equal to the expected length of stay, and a number greater than one meaning that the observed patient length of stay was greater than the

expected length of stay. For HealthCo, their expected value and benchmarking for length of stay ratio were established and calculated by UHC.

The leadership team, specifically Green4 and Purple1, selected patient length of stay as a focus for the Jishuken room because it had a direct impact on customer value and was impacted by a broad range of issues throughout the organization that would require collaboration and teamwork between departmental management to address. Based on data available from UHC, Green4 and Purple1 identified four areas of the enterprise that required immediate attention, including the model area NICU, surgery, and two internal medicine groups. In the Jishuken room, groups were established to address each of these areas. Every group contained a physician and nurse in a leadership role within that unit, data experts who could complete data analysis for the group, and other content experts who were familiar with the work being done in their respective areas. Each group would be facilitated by a Purple role person, and the groups were split up so that Purple2 would facilitate the surgery team and one of the internal medicine teams, and Purple3 would facilitate the NICU team and the other internal medicine team. Purple 2 and Purple 3 instructed and coached team members in the 8-Step Problem Solving Method and ensured that all team members stayed on track throughout the process, and Purple 4 and Purple 5 also assisted with coaching and facilitation. Results and analysis of the length of stay groups will be addressed in Chapter 5 of this report.

Another Jishuken room problem was identified by Green2 and involved patient falls throughout the enterprise. To address this problem, a team of staff nurses and nurse leaders from across the enterprise were assembled. Purple3 and Purple4 co-facilitated the group, teaching the 8-Step Problem Solving Method in its entirety to the group as each

step was completed and ensuring that all team members followed the rules and principles of the 8-Step Problem Solving Method. Results and analysis of this group will be addressed in Chapter 5 of this report.

4.5 Staff Training and Education

Educating staff in the principles and practices of Lean is a key to establishing a culture that is conducive to Lean transformation. Team members must not be trained only on techniques, however, but must also be trained to acquire an ability to apply their wisdom and knowledge to their work in order to maintain a stable process and respond to changes in their environment (Saito et al, 2012). Learning for a Lean environment requires that team members be educated on the soft- and hard-side of Lean in order to deal with the cultural and technical aspects of problems, which requires a more problem-based learning approach to teaching Lean (Badurdeen et al, 2010b).

Taiichi Ohno once stated that "Education means to help someone discover unknowns, while practice helps someone master what they know through repeated application. Education without practice in applying what has been learned does not amount to much" (Saito et al, 2012). Mirroring this statement, Fujio Cho, the current president of Toyota, states that "Getting education by itself does not make a person learn a new skill. Practice, repeating what one has learned daily, is necessary to digest and retain the knowledge so it becomes part of one's nature" (Saito et al, 2012). For this reason, Lean learning at Toyota begins with hands-on activity and introduces conceptual concepts afterwards (Badurdeen et al, 2010b).

Because Lean transformation requires the transformation of an organization's culture, which is very difficult and has a very low success rate, it is important to train

Lean champion's to support the organizational transformation by training them in the technical and cultural aspects of Lean thinking (Badurdeen et al, 2010b). Other organizations have recognized this as well, and have put programs in place to train their leaders and team members in Lean philosophies, encouraging them to participate in cultural and technical transformation throughout their enterprise. Often, companies find it useful to utilize contracted educators to teach their organizations about Lean, though some may develop their own training materials to coach their employees in Lean (Jenkins and Gisler, 2012). Virginia Mason Medical Center, for example, required all of their approximately 5,000 employees to attend an "Introduction to Lean" course, and many also participate in Rapid Process Improvement Weeks, while ThedaCare, Inc. requires all staff members to attend an Event Week, which is an intensive process improvement effort (IHI, 2005).

When teaching Lean in a hospital environment, it is important to have facilitators who are familiar with Lean philosophies and practices, but it is also crucial that they have an understanding of clinical practice and the needs of clinical employees and patients. These facilitators must be able to identify the needs of the clinical employees, address those needs, and relate the Lean principles to health care through creative applications, while not over-utilizing industrial terms or comparisons to manufacturing environments (Poole et al, 2010).

At HealthCo, several techniques for educating staff were used. Firstly, as previously discussed, Lean education was contracted to LeanCo, who trained and certified members of the leadership transformation team in Lean efforts, along with educating the executive leadership team on the benefits and requirements of a Lean

transformation. Secondly, HealthCo utilized week-long problem solving Flight Trainings to educate staff on the 8-Step Problem Solving Method through hands-on problem based learning. Finally, HealthCo moved to develop Lean simulations that related Lean tools and concepts to clinical, patient care environments.

4.5.1 Problem Solving Flight Training

Toyota's 8-Step Problem Solving Method closely mirrors Deming's PDCA cycle and is a large reason for Toyota's continued success and improvement, though most other companies who have adopted the method have not seen the same level of success (Marksberry et al, 2011). The 8-Step method is a systematic process that integrates the wisdom and knowledge of all team members that results in continual improvement and growth for the company and increased job satisfaction for employees. However, for a company to be successful, it must think of problem solving as more than just a form and must change their thinking to fully understand and accept the method (Marksberry et al, 2011). The method consists of eight steps, which must be followed completely and thoroughly in order to achieve success. These standardized steps are outlined in Figure 4.8 (Marksberry et al, 2011).

Figure 4.8: Toyota's 8-Step Problem Solving Method.

This method relies heavily upon self-investigation and genchi genbutsu, which translates from Japanese to going to the source to find facts, to identify the root cause of the problem and develop sustainable solutions to eliminate the root cause (Badurdeen et al, 2010a). A facilitator is utilized to coach the team on how to complete each step, make sure communication among team members is good, encourage the team to practice genchi genbutsu, and ensure that the team stays on task (Marksberry et al, 2010).

An ideal method for teaching problem solving is to utilize authentic problems and allow the group of trainees to work through the methodology with the real-life problem, which provides and experience that gives participants an opportunity to engage and motivate themselves during the learning (Badurdeen et al, 2010b). At HealthCo, this problem-based learning methodology was enlisted to train team members and leadership

the 8-Step Problem Solving Method. HealthCo taught the problem solving method to team members in a 32 hour, four day course, which utilized real enterprise problems to encourage learning. In the early stages of these problem solving Flight Trainings, LeanCo was contracted to teach the courses, which would be led by Orange3. During these trainings, approximately six trainees were assigned to a problem solving team and were assigned a problem that they would be addressing throughout the week. During the training, the trainees would be exposed to approximately two hours of PowerPoint presentations explaining the 8-Step process, while the other 30 hours of the course would be spent working through the method and utilizing genchi genbutsu to see the problem at its source. Each team works through seven of the eight steps during the training and are encouraged to follow through with completing the entire process after the training had ended.

Throughout the LeanCo-led Flight Trainings, HealthCo recognized that the industrial and manufacturing examples that were utilized to portray the methodology were not be the best method for teaching their health care employees, as many of the trainees expressed confusion with the examples. Furthermore, HealthCo also found it appropriate to develop internal facilitators to lead and instruct the future Flight Trainings throughout the enterprise. To combat these issues, Purple2 and Purple3 began the process of observation and education so that they could take over the facilitation responsibilities. After observing Orange3 teach the course, and after teaching sections of the course under the observation of Orange3, Purple2 and Purple3 had developed the capabilities to facilitate the training sessions and coach team members throughout the process. Furthermore, Purple2 and Purple3 would enlist the help of Purple4 and Purple5

in coaching during the Flight Training sessions. Also, in order to mitigate any confusion generated through the use of manufacturing examples, HealthCo developed health care related problem solving materials, which utilized real examples of problem solving from HealthCo and related the material to a clinical environment to bolster understanding in participants. This health care training material would also be used to foster one voice for Lean throughout the enterprise during Flight Trainings.

The Flight Training sessions at HealthCo have continued to evolve since the development of the health care oriented training material. Because of a lack of results and improvements from the problem solving teams, HealthCo leaders encouraged change to put less emphasis on developing and breaking down the data in Step 2 of the 8-Step Problem Solving Method, and move more towards testing small cycles of change in Step 5. Furthermore, HealthCo has experienced much issue with getting teams to follow through with the projects and countermeasure implementation after the training had ended. To counter this, during problem development for the training, process owners were identified to move forward with the problem after the training was completed. A further analysis of the Flight Trainings and their effectiveness can be found in Chapter 5, and a complete list of problems addressed in the training can be found in Table 4.6. A table summarizing the number of participants who have been through the Flight Training can be found in Table 4.7.

Table 4.6: Problems addressed in Flight Training sessions at HealthCo.

Flight Number	Date	Problem	Number of Participants
1	June 2012	• NICU TPN Delivery	6
2	July 2012	• PICU Unintended Extubations	4
3	August 2012	• Medication Transfers • Nurse Contact with Physician	13
4	September 2012	• Pneumococcal Vaccine (1) • Medication Supply • Critical Lab Values	19
5	October 2012	• Pain Management • Unavailable Medications • Pneumococcal Vaccine (2)	8
6	October 2012	• ED Door to Doc • ED Bed Ready to Final Transfer • Medication Side Effects Education	18
7	December 2012	• Patient Belongings • IT Requests	15
8	January 2013	• Patient Isolation • Curtains • Pneumococcal/Influenza Vaccine	14
9	February 2013	• Controlled Substance Chain of Command • Transport Delays • Needlesticks	18

Table 4.7: Participants in Flight Training sessions at HealthCo as of February 2013.

Occupation	Number of Participants
Nurse	74
Physician	5
Pharmacist	4
Other	32
Total	115

4.5.2 Lean Simulation

Lean simulations are a way for participants to learn Lean concepts and experience the incremental changes that are involved in a Lean transformation while demonstrating the soft- and hard-sides of Lean (Badurdeen et al, 2010b). At HealthCo, members of the transformation team who went through the certification course at LeanCo were exposed to a simulation that demonstrated the Lean tools and concepts in an incremental fashion, allowing for the improvements to the system to be recognized and measured by the participants. However, HealthCo found that those who participated in the manufacturing based simulation at LeanCo had trouble relating the concepts learned to health care, as most of their time was spent familiarizing themselves with the manufacturing techniques. These issues left many HealthCo employees who were certified by LeanCo with little understanding of how Lean concepts look in a health care application.

Recognizing this, HealthCo sought to develop a healthcare lean simulation that would transfer the lessons learned in the LeanCo simulation to a health care environment. To do this, the manufacturing simulation was translated to an outpatient surgical scenario. Lean concepts such as stability, standardized work, 5S, flow, error proofing, production leveling, line balancing, pull, and kanban were incorporated to show how they can be applied in a healthcare setting. This method was tested and eventually incorporated into the 8-Step Problem Solving Flight Training to teach participants Lean concepts before beginning problem solving.

5: ANALYSIS

The following section analyzes the progress made in Lean transformation at HealthCo during the first year of transformation efforts. Much of the analysis made will be based on the goals, timelines, and expectations that were developed by HealthCo during the implementation, thereby judging the progress at HealthCo against the standards that it set for itself, though other criteria will also be used. Furthermore, the development of a Lean culture, the most crucial component to Lean transformation and the most often overlooked, will be analyzed based on several criteria. The analysis will in most cases be based on a qualitative scale, utilizing four different rankings for the progress made in a certain category. These rankings will be optimal, good, acceptable, and not good. This methodology for evaluation is one commonly used at Toyota, especially in the 8-Step Problem Solving method. Furthermore, based on the qualitative nature of observational data, this method is ideal for the analysis of progress made in Lean transformation at HealthCo. Issues and errors encountered during transformation will also be discussed in this section as will their overall impact on the progress of Lean implementation at HealthCo.

5.1 Analysis of Transformation Plan and Vision

As discussed previously, one of the first components of the transformation at HealthCo was the development of a plan for transformation. The plan consisted of three main components: model area development, management-led problem solving activities, and staff education on Lean concepts and principles. The timeline for this plan stated that a model area would be developed in the NICU within two years so that Lean could then be sequentially rolled out throughout the enterprise, with self-sustainability being realized in the five years. During this time, the organization would work to continually educate

staff on Lean principles and address problems as identified by leadership in the Jishuken room. However, though some areas of the plan have been conformed to, many items, especially model area development, have fallen behind schedule or been abandoned because of a lack of progress. There could be many reasons for the lack of conformance to the original transformation plan. First of all, the expectations for the timeline at HealthCo may have been too aggressive. Many industries rush to results when implementing Lean, which sacrifices the development of the culture and processes that are necessary to make results sustainable. The development of Lean is a long process that should not be rushed. When introducing totally new concepts into an organization, it is natural for progress to move slowly (Ohno, 1988). Toyota has developed their current capabilities over decades of improvements. In fact, it took 10 years just to establish kanban within Toyota (Ohno, 1988). Secondly, a lack of commitment throughout the organization to the Lean transformation may have played a role in the lack of conformance to the schedule. This will be further discussed in the following section.

Next, the leadership at HealthCo developed a vision statement that would guide the organization through the transformation and be the driving force for identifying and solving problems throughout the organization. The vision statement related customer value to the goals and principles of the organization. The vision was also to act as a tool to create buy-in in staff members and inspire change throughout the organization. It was posted in the Jishuken room, and was to be the common voice used to describe the Lean transformation and values that the company would be guided by moving forward. Though the vision was developed in consideration of the patient, little was done to communicate the vision throughout the enterprise. Beyond posting the vision in the

Jishuken room, there was little mention of it in any other organizational activities. It was rarely, if at all, mentioned in any of the transformation leadership meetings, management-led problem solving activities, or Flight Trainings, nor was it posted anywhere outside of the Jishuken room.

Principles, practices, meeting rules, and the HealthCo house were also developed as a part of the planning phase of the transformation. These items were also posted in the Jishuken room, but, unlike the vision statement, the principles, practices, and house were discussed and reviewed at the beginning of each Flight Training. This gave an opportunity for the Lean message to be spread throughout the company and allowed for staff to understand the reasoning behind the transformation, which is a crucial part of inspiring change in an organization. Despite the fact that the principles and practices were more openly communicated throughout the organization, there were still issues with adherence to them. Furthermore, the meeting rules were rarely addressed in meetings and many were not adhered to. An analysis of the adherence to the practices can be found in Figure 5.1, and an analysis of the adherence to the meeting rules can be found in Figure 5.2. These analyses are based on an overall compliance from the onset on implementation in January 2012 through March 2013.

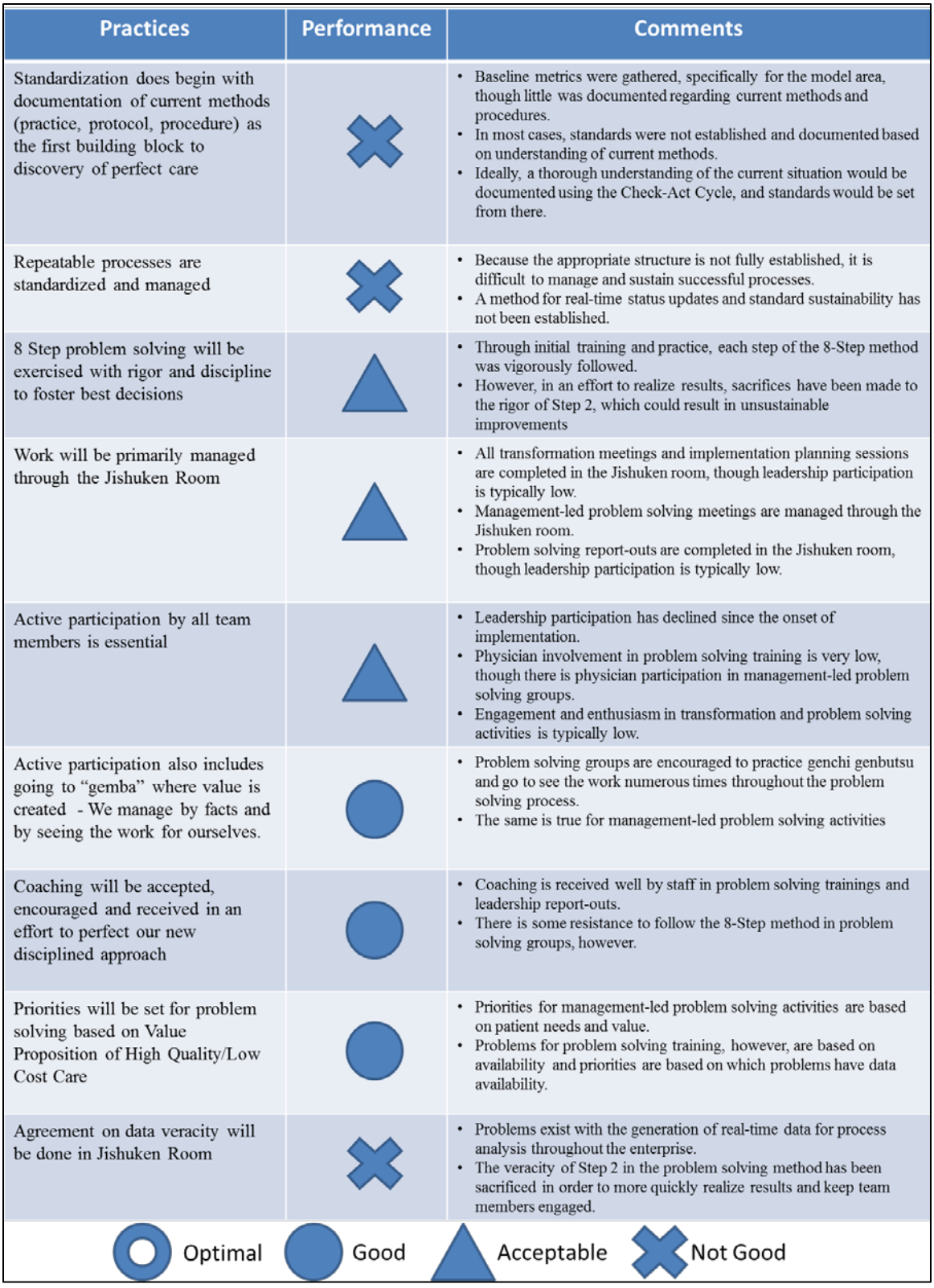


Figure 5.1: Analysis of performance relating to established practices as of March 2013.

Practices	Performance	Comments
All meetings will be led by a designated facilitator.	●	• Meetings were typically led by a designated facilitator; usually Purple1, Purple2, or Purple3.
Facilitator will be responsible for developing the meeting purpose/outcome and agenda, and distributing to team members at least one day prior to next meeting, using the standardized meeting agenda template.	▲	• A standardized meeting agenda was developed at the onset of transformation. • However, distribution of the meeting agenda and meeting notes has been inconsistent and is rarely completed for transformation meetings, though it is consistently distributed for management-led problem solving meetings.
All meetings will have a designated recorder who will summarize the meeting on the standardized meeting record template, and will distribute the notes to all team members within two days of the last meeting.	▲	• The designated recorder is typically the facilitator (Purple1, Purple2, or Purple3). • Distribution of meeting notes is inconsistent and is rarely completed for transformation meetings, though it is consistently completed for management-led problem solving meetings.
No meeting will be held without a clearly stated meeting purpose/outcome and agenda for that particular meeting.	▲	• A standard purpose/outcome was developed for management-led problem solving meetings and is typically adhered to. • Purpose/outcomes for transformation meetings are rarely stated or communicated in advance of the meeting.
The meeting agenda may be modified as needed at the beginning of each meeting, and may be modified during a meeting with the agreement of the team members present.	●	• Standard agendas were developed for both the transformation and management-led problem solving meetings and are typically adhered to.
Other than the agreed upon modifications, the agenda will be adhered to by all team members to assure the meeting outcome is achieved.	●	• Standard agendas were developed for both the transformation and management-led problem solving meetings and are typically adhered to, though meetings do occasionally get off track.
Discussion and consensus will be the preferred decision making tool, with majority vote if consensus becomes too difficult and time consuming.	▲	• Discussion and consensus are not always utilized to make decisions, as decisions are sometimes delegated from leadership or physicians participating in the meeting.
All members will treat each other with respect by being prompt in attendance, placing cell phones on silent, not interrupting others when they are speaking and not having "side-bar" conversations.	✖	• It is typical to see tardiness at both transformation and problem solving meetings. • It is also typical for team members to leave the meeting to answer phone calls or have their phones go off in the meeting.
The HealthCo Lean staff will be the coaches on good process and lean thinking for designated HealthCo leaders.	●	• HealthCo Lean staff typically lead transformation and problem solving meetings and make an effort to coach others on Lean methods.
The HealthCo leaders will be the implementation staff by engaging appropriate staff for carrying out the implementation steps and reporting to upper management and other work units.	●	• HealthCo Lean staff attempt to engage and involve appropriate team members and facilitate those team members in presenting to upper management
The meeting will start and end on time	✖	• Because of tardiness, meetings rarely start exactly on time, though they do typically end when they are schedule to.

Optimal ○ Good ● Acceptable ▲ Not Good ✖

Figure 5.2: Analysis of adherence to meeting rules as of March 2013.

The matrix in Figure 5.3 illustrates the progress and performance made in the development and completion of a plan and vision during the transformation at HealthCo. The analysis is based on an overall progress from the onset on implementation in January 2012 through March 2013. Though a plan was developed, it was not adhered to and may have been too ambitious to allow the necessary culture change to foster the Lean environment. A vision was developed, but very little was done to communicate this throughout the organization, or at least those involved in transformation activities, which limited the ability to create one voice for change throughout the enterprise. Finally, practices and philosophies were established and communicated, but more could have been done to adhere to those practices and to inspire change and foster the culture change needed to succeed in transformation.

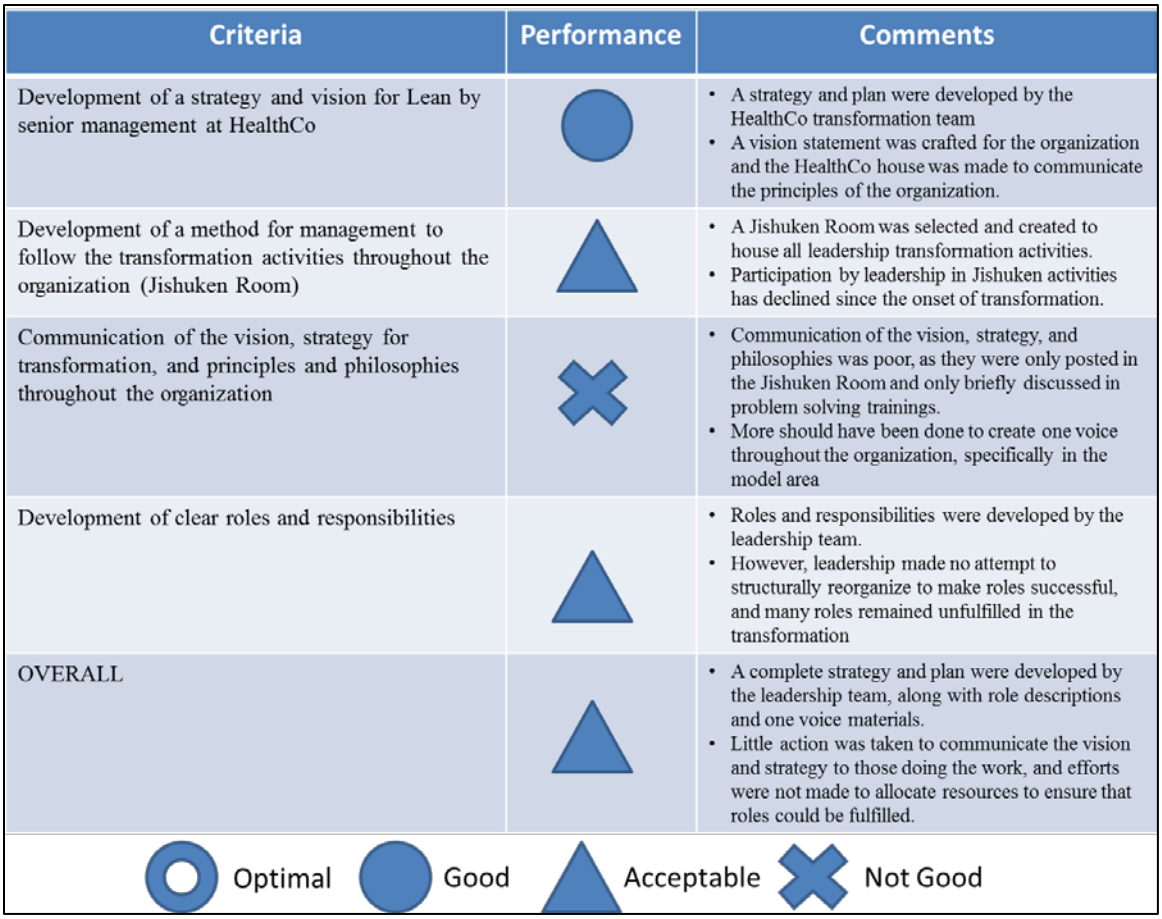


Figure 5.3: Analysis of strategy and vision development as of March 2013.

5.2 Analysis of Transformation Leadership

Leadership plays the most important role in a Lean transformation, and it is generally accepted that Lean implementation relies on effective leadership to shape and sustain change within an organization (Waring and Bishop, 2010). Specifically in health care, leadership must have the commitment to overcome the deeply imbedded resistance to change that can limit the implementation of Lean (Radnor et al, 2012). For success, leadership must fully commit to and support Lean transformation. They must be the spokespeople for change and must inspire staff to shift the organization to one that sees value through the eyes of the customer and moves to create that value through continuous improvement. They must involve others in the decision making process, give them the

information that they need to do their jobs, give them responsibility for their work, and recognize their contributions in order to build the culture of continuous improvement (Saito et al, 2012). This culture must foster standards and empower employees to stop the line when they recognize a problem, moving from a people-blaming, results-based culture to a process-oriented culture (Ohno, 1988, IHI, 2005, Greenwood et al, 2002). Furthermore, leadership must change the systems and structure of the institution to foster the growth of the Lean culture (Melanson et al, 2009).

The first necessity for developing a culture of change is to drive change from the top of the organization downward. At HealthCo, however, the desire to transform to Lean did not start at the top-executive level, rather, it started a step below with the Chief Medical Officer, Green1, and the Director of Quality and Safety, Purple1. Green1 and Purple1 sought to include the executive team in the transformation process, but involvement was never really established. The CEO, Blue1, was never directly involved in the Lean decision making and Lean transformation meetings beyond the initial executive training at LeanCo and the approval to move forward with the transformation efforts. By not having the full commitment and support to the Lean initiative at the top level of the organization, HealthCo was at a disadvantage.

Further issues arose when Green1, the person who had inspired the Lean transformation at HealthCo, left the organization to accept a position at another institution. This was a major hit to the progress of the transformation, because, up to that point, Green1 had driven much of the work related to the transformation, including the partnership with LeanCo, development of the strategy, vision, practices, and philosophies, assembly of the transformation leadership team, and selection of the NICU

as the model area. Without his commitment to change and belief in the Lean values and philosophies, HealthCo was set back in their efforts. Furthermore, Green1 had made most decisions relating to the transformation, obtaining approval from the rest of the transformation team as decisions were made, which meant Green1 had a path in mind for the organization that others may not have possessed. Though Green1 had driven most of the change from the onset of the transformation, Green2 accepted the responsibilities as the Lean leader of the organization and stepped in to take over the duties of Green1. As the Chief Nursing Officer, Green2 was in the perfect position to inspire change throughout the nursing ranks, while also having the ability to influence physicians throughout the enterprise. However, during periods of transition, it is difficult to accept new responsibilities, and participation in transformation meetings, problem solving report outs, and Lean activities slowly declined over the following months. The new Chief Medical Officer, Green4, has had little participation in Lean activities and the level of buy-in and commitment to the Lean implementation is unknown.

The next unexpected issue with HealthCo was the budget cut that forced the organization to lay off employees across the enterprise. Layoffs can be detrimental to trust and morale in an organization and make cultural change very difficult to realize. These morale and workforce issues were especially prevalent in the NICU model area, as will be discussed in a later section.

Top-level leadership participation in Lean activities, staff report-outs, and transformation meetings is essential to create buy-in throughout the organization and move forward with transformation. Though leadership involvement was exceptional in the initial months of transformation, with strong showings in transformation meetings and

staff report-outs by members of the leadership team including Green1, Green2, Green3, Purple1, and Purple2, participation has slowly trailed off. Currently, attendance to transformation meetings and problem solving report outs has been low, with frequent absences by key members of the transformation leadership team. Seeing that there is already little to no participation by the executive team, it could be devastating to the transformation efforts to lose participation at the Green role level as well. It has been speculated by members of the leadership team who regularly attend the transformation meeting that scheduling conflicts could be to blame, and efforts are being planned to revamp and reschedule the meetings and report-outs to facilitate better turn out from leadership.

A major job of transformation leadership was to develop roles and responsibilities, as discussed in a previous section. These roles are to guide the behavior and action of the leadership team in order to drive the cultural change forward and fulfill the transformation. However, though roles were developed and responsibilities described, many roles were not communicated or left unfulfilled. Figure 5.4 shows an analysis of the fulfillment of roles in the enterprise. The analysis is based on an overall role fulfillment from the onset on implementation in January 2012 through March 2013. One challenge to the fulfillment of these roles may be the matrix structure that exists in HealthCo. Whereas in industry, and in Toyota, the structure is typically that a manager or team leader manages several team members below them, with a group leader managing several team leaders, and so on, with one department manager leading the entire department, a matrix organization allows for several department level managers to lead the department. At HealthCo, departments are led by a triad consisting of an

administrative director, a nursing director, and a medical director. This reporting structure makes it difficult to define and share roles within a department and makes the development of an accountability system very challenging. Developing a structure that is conducive to change is a major responsibility of leadership, and little was done to alter the existing structure and organization to accommodate the changes necessary to develop the culture and inspire change throughout the organization.

Role	Performance	Comments
Blue • Overall cultural transformation leader • Bring along the rest of the executive team • Jishuken room "owner" • Keeps focus on both results and process • Report Outs – How to " Respond" • Target Setting (What, How good , When) • Decision Making • Resource Allocation		• Top-level management did give buy-in to the transformation after attending executive leadership training and the leadership team presented the proposal for transformation. • However, the top-level executive at HealthCo had little involvement in any transformation activities.
Green Executive leadership team committed to support the culture transformation by participating in education about the process and the Jishuken room and model area problem solving report-outs • Report Outs – How to "Respond" • Target Setting (What, How Good, When) • Decision Making • Resource Allocation		• Most of the leadership team, particularly Green1 and Green2, participated in transformation activities and played a large role in moving the organization forward with the transformation. • The transition after the departure of Green1 did cause some issues, as Green1 was the main driver behind the change. • Green4, who filled the position of Green1, has yet to become heavily involved in transformation activites.
Purple • Developed expertise in 8 step problem solving and process flow analysis • Facilitates problem solving activity for management directed problems • Facilitates the discovery of the priority problems to attack through analysis and bottleneck discovery • Maintains the Jishuken room • Trains and develops staff from other units temporarily assigned to Jishuken room • Develop Metrics • Extract info from Data • Analysis		• Those in this role have done an exceptional job of developing expertise in 8-Step Problem Solving, facilitating problem solving groups, and training staff on Lean methods. • Data extraction and methods for data creation are still lacking throughout the organization. • The Jishuken Room has been properly maintained, though some problem solving materials are not always kept up-to-date when being displayed in the Jishuken Room.
Brown • Facilitates the problem solving activity undertaken by the Jishuken room (management directed priority) • Trains the 8 step problem solving process for the staff participating from the target unit • May be filled by "permanent" Jishuken room person or one of the unit's rotational assigned staff • Process understanding • Metrics understanding • Facilitates development of Standard Work and Kaizen Activities		• Fulfillment of this role was not maximized because the proper leaders from the model area were not involved at the onset of transformation. • Much of the burden of this role fell on Brown3, as Brown1 and Brown2 did not become involved until much later in the process.
Yellow • Staff from various units on a 6 month to 1 year rotation for supporting the Jishuken room and to learn the problem solving process and analysis tools for taking back to their units to begin spreading the uniform cultural transformation • In conjunction with the Brown role, staff from the targeted problem site unit to support and participate in the problem solving activity in their own work area		• The yellow role was never strongly developed and resources were never allocated by leadership to allow fulfillment of this role, specifically in the model area.
		

Figure 5.4: Analysis of role fulfillment during transformation as of March 2013.

Though a leadership team was established, the departure of critical team members, the lack of top level participation, and layoffs throughout the organization created significant barriers for the success of the transformation at HealthCo. Leadership participation in Lean activities and transformation meetings, though exceptional at the onset, has decreased significantly. Established roles and behaviors have not been strictly adhered to and there has been no structural or organizational change to foster the necessary culture change for Lean transformation. An overall analysis of the transformation leadership can be found in Figure 5.5. The analysis is based on an overall leadership progress from the onset on implementation in January 2012 through March 2013.

Criteria	Performance	Comments
A personal commitment to nurture Lean culture in the top-level executive (Blue Role) of the organization	✖	• The top-level executive at HealthCo had little involvement in any transformation activities and has not demonstrated commitment to the transformation
An understanding of the top-level executive's (Blue) role in relation to Lean methodology and behaviors	✖	• It is important for cultural and behavioral changes to be demonstrated and driven from the top down in a Lean implementation. However, there has been little demonstration of Lean behaviors by the top-level executive, as there has been little participation in transformation activities.
A personal commitment to nurture Lean culture in the executive level (Green Role) of the organization	▲	• The executive team has played a large role in the transformation and has typically participated in transformation activities, though participation is slowly declining. • Green1 was the main driver behind the transformation and has since left the organization, which was a major setback to the commitment at the Green level. • Green2 took over the transformation leadership role in lieu of Green1, and Green4 has yet to become fully involved in the transformation.
An understanding of the executive level (Green) role in relation to Lean methodology and behaviors	✖	• Cultural and behavior changes have been demonstrated at the Green level and there has been participation in transformation activities, though more time should be dedicated to transformation efforts at the leadership level, as it is not currently seen as a priority by those doing the work, specifically in the model area. • It is important that the executive team structurally reorganize the organization to facilitate the transformation and enable crucial roles to be fulfilled. This reorganization and allotment of resources did not happen during transformation, specifically in the model area.
OVERALL	✖	• The leadership team must do more to inspire culture change throughout the organization by becoming more involved in transformation activities, dedicating the necessary resources to achieve transformation, and reorganizing existing structures to facilitate implementation and fulfill roles.

○ Optimal ● Good ▲ Acceptable ✖ Not Good

Figure 5.5: Analysis of transformation leadership as of March 2013.

5.3 Analysis of Jishuken Room Development

The Jishuken room at HealthCo was developed to house the materials related to the Lean transformation and transformation activities. Initially, there was difficulty in selecting a location for the Jishuken room at HealthCo. Room availability was limited, especially rooms that were accessible and large enough to house the transformation activities. Once a room was established, the meeting rules, practices, philosophies, vision statement, roles, and transformation plan were all posted in the room to communicate the strategy and vision for moving forward with the implementation. Furthermore, Flight Trainings, staff problem solving report-outs, and transformation meetings were also held

in the Jishuken room, though, as discussed, leadership attendance was low in some cases. Posters communicating the status of every problem solving project, report-out schedule, and Flight Training schedule were also housed in the Jishuken room, and they were generally kept up to date by the owners of the Jishuken room. Ideally, Blue1 would have been the owner of the Jishuken room. However, because of a lack of direct involvement in transformation activities, Purple2, Purple3, Purple4, and Purple5 took main ownership of the room. They were tasked with keeping posters up to date and making sure that the Jishuken room demonstrated the philosophies and goals of the Lean transformation.

Issues did arise in the Jishuken room when the room was double-booked. In cases when Flight Trainings were scheduled in conjunction with other hospital meetings for the Jishuken room, specifically rapid root cause analysis meetings, the Lean activities had to find another location. This made it very difficult to accommodate the four day Flight Trainings in some cases, as other meetings were typically scheduled for the Jishuken room throughout the week. This also demonstrated a lack of commitment to the Lean transformation and reflected poorly on leadership commitment to change, as Flight Training participants voiced displeasure about the locations of the trainings. Ideally, the Jishuken room would be solely dedicated to transformation and Lean activities, and, in the event that it had to be used for another purpose, Lean activities would take precedence over all other meetings. An analysis of the Jishuken room development can be found in Figure 5.6. The analysis is based on an overall Jishuken development progress from the onset on implementation in January 2012 through March 2013.

Criteria	Performance	Comments
Clearly post HealthCo transformation plan, philosophy, principles, and practices		• All materials relating to the HealthCo transformation strategy, plan, philosophies, principles, and practices were posted in the Jishuken Room for all team members and participants to view
Dedication of the space to house all transformation activities, including transformation meetings, management-led problem solving groups, and Lean training for team members		• Though the room was used consistently for transformation team meetings and problem solving group meetings, the room was not able to be used for team member training when there were scheduling conflicts, as other meetings were given priority over the Lean training sessions.
All posted materials should be kept up-to-date to demonstrate the real-time status of the transformation		• Outdated materials were sometimes posted in the Jishuken Room, specifically problem solving reports. • Generally, most materials were kept up-to-date, including the philosophies and practices
OVERALL		• Though transformation materials were clearly posted and displayed, the Jishuken room should be devoted to Lean activities, and this often was not the case, as other meetings took precedence over team member training sessions when there was a scheduling conflict.

Figure 5.6: Jishuken room analysis as of March 2013.

5.4 Analysis of Model Area Development

Progress in the NICU model area was at a disadvantage from the onset because not all critical parties were involved in the decision to utilize the NICU as the model area. In the beginning, Green1 made the decision to move forward with the NICU as the model area, in conjunction with the transformation team, and kicked things off by involving Brown3 in the transformation meetings and sending Brown3 to the certification course at LeanCo. As noted earlier, Brown3 is the lead attending physician in the NICU, which gives her influence over other physicians in the unit. However, physicians are only a small part of the NICU staff, as nurses and other professionals make up a large portion of the staff population. By not including Brown1 and Brown2, who have influence over the nurse population in the NICU, Green1 set the model area at a major disadvantage. When implementing Lean, it is essential to have the complete buy-in and commitment of all department leadership, and, in this case, only a portion of that was achieved.

Transformation and model area plans were not even discussed with Brown1 and Brown2 until several months after the transformation had kicked off, and only then were they sent to the same certification course at LeanCo and included on transformation meetings.

The lack of inclusion created tension between the nursing and physician counterparts in the NICU leadership. Because Brown1 and Brown2 had no inclusion in the model area development initially, Brown3 was left to complete model area activities alone. This led to complaints from Brown3 that nursing was not involved in problem solving activities, that Brown3 was becoming overwhelmed with responsibilities, and that all of the work was being done by one person, when, in reality, a true transformation requires the work of a team throughout the unit. Furthermore, this led to Brown3 having to delegate solutions to problems to nurses, whom Brown3 had no influence on, without soliciting input from those doing the work, which led to further tension and unsustainable improvements. In developing the model area, all members of NICU leadership should have been involved in the decision making and should have been trained concurrently. This would have allowed for a smoother transition into Lean, a more balanced work load for all members of unit leadership, and less frustration and tension among unit leadership.

More underlying tension and resistance to change rested in the instability that was present in the NICU, and stability is an integral part of implementing Lean throughout an enterprise (Marksberry et al, 2011). Brown1 and Brown2, after being involved in the transformation, complained of staffing issues that made it nearly impossible to allow floor nurse participation in Lean activities. A commitment from leadership was not made to supply the unit with the necessary resources to allow nurses to be trained in 8-Step Problem Solving, which limited their ability to participate in improvement activities

throughout the unit. For a company to succeed with problem solving, those who are expected to use it must have a full understanding of the methodology and way of thinking (Marksberry et al, 2011). Without proper training, it was difficult for staff to gain this understanding. Brown3 was quoted in a transformation meeting as saying the following: "If we get nurses in the group, it is for an hour at the end of their shift, if we can even get them." Without a commitment from leadership for staff in other roles besides that of Brown3 to be freed up to complete model area activities, tensions continued to grow and little real progress was made. One model area employee stated that "People feel that there is not a commitment at the enterprise level to dedicate the staff and resources to this problem solving initiative. We don't believe it is going to happen." These feelings of resentment towards leadership are not conducive to the cultural change that is necessary to implement Lean.

Furthermore, the lack of resources in the NICU limited the ability to gather data necessary for 8-Step Problem Solving, an issue commonly noted by Brown3. In a true Lean system, data for the process is seen in real time and comes from within the existing systems and infrastructure. However, there was never any change driven from leadership to establish these data systems or infrastructure beyond developing KPIs. Good performance measurement systems for Lean processes are simple, do not include many metrics, support the implementation strategy, motivate staff, and measure the processes in real time so that action can be taken when the process is not going well (IHI, 2005). However, there was never a commitment from leadership, nor effort, to establish such a system in the NICU.

If management does not implement Lean in the proper way, demonstrating the principles of trust, teamwork, and respect, and seeking involvement from those involved in the process, damage made to the organizational culture can outweigh any benefits that were gained from improvements (Marksberry et al, 2010). This was the case in the NICU model area at HealthCo. By not establishing buy-in and commitment from all leadership of the NICU, cultural damages and tension were created within the department. Furthermore, the lack of commitment and dedication of resources to allow NICU staff to be trained and participate in 8-Step Problem Solving on their unit inhibited the ability of the model area to move forward with improvement. Eventually, instead of working to correct the wrongs done and mend the cultural issues by dedicating resources to the unit, the transformation team made the decision to withdraw from the NICU as the model area. The search is now underway for a new model area, and lessons learned from the NICU will be applied by the HealthCo transformation team in developing and selecting this new model. An analysis of the model area development can be found in Figure 5.7. The analysis is based on an overall model area progress from the onset on implementation in January 2012 through March 2013.

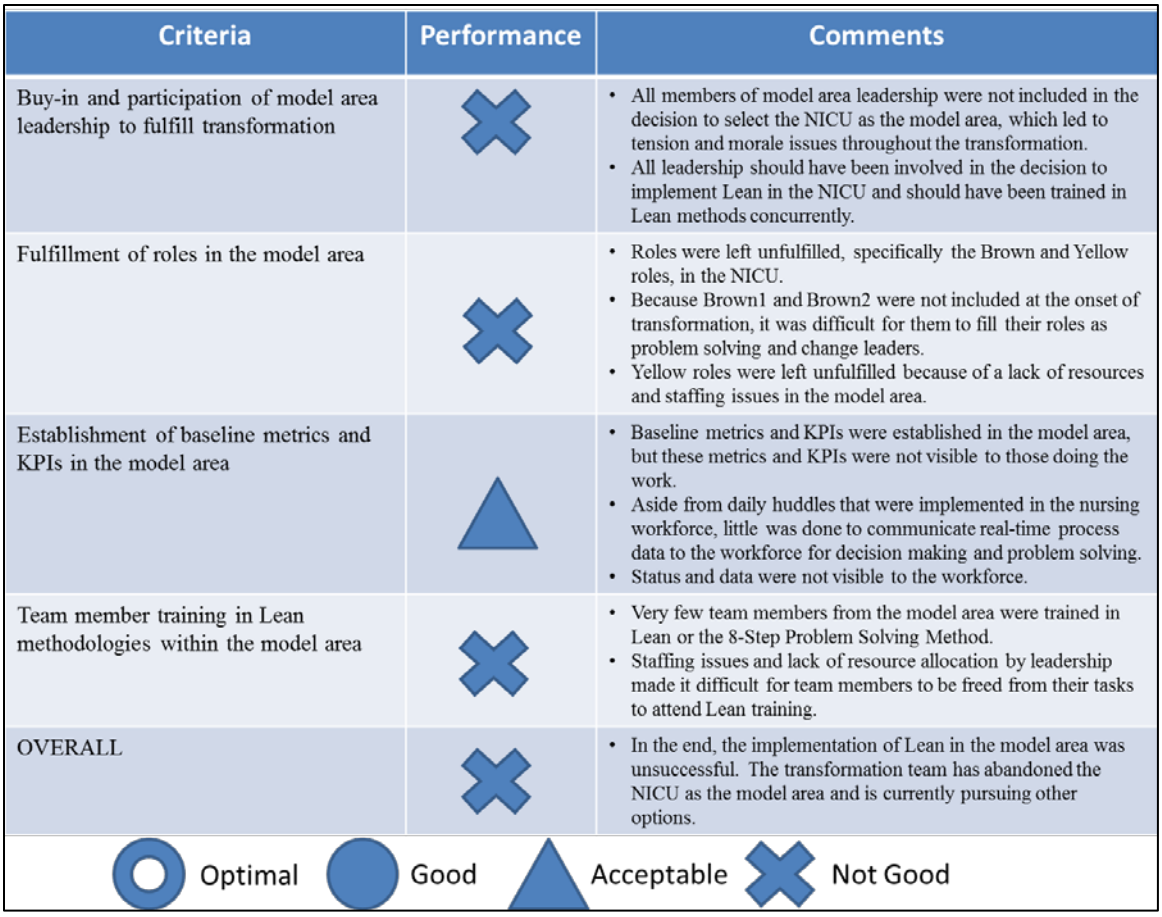


Figure 5.7: Model area analysis as of March 2013.

5.5 Analysis of Management-Led Problem Solving Activities

Problem solving should be a regular activity for employees who are not working on the floor daily, and management is expected to solve problems within their scope in the organization (Marksberry et al, 2011). At HealthCo, these management-led problem solving activities were facilitated through the Jishuken room and focused on patient length of stay. In reviewing the data, the leadership team, specifically Purple1 and Green4, decided it would be appropriate to address the length of stay throughout the enterprise, as HealthCo was not at the expected level as measured by UHC. To kick off the process, four areas of concern were established: the NICU, surgery, and two internal medicine teams. When problem solving, it is ideal to settle on one prioritized problem

when breaking down a problem. However, in this case, four prioritized areas were chosen. It may have made the process less complicated and more efficient if only one area had been chosen for focus, perhaps the model area NICU, which would have also aided in model area development. However, the decision to choose four areas of focus also created good outcomes.

To address these areas where improvement was needed, a team was developed from management, leadership, and staff from each respective area to utilize the 8-Step Problem Solving method to investigate the length of stay issues. Each group was facilitated by either Purple2 or Purple3, and each set up regularly occurring meetings to discuss the problem and work through the process. During these meetings, issues were encountered, however. In some groups, facilitators had a difficult time getting productive participation from team members, more specifically, physicians. In many cases, physicians were reluctant to participate because they felt they had other higher priorities. And, when physicians did participate, there was sometimes an inability to take criticism or suggestion for other team members, though this was not the case with a majority of the physicians. When team members did express displeasure with criticism, it hampered team dynamics and affected the ability of the teams to move forward. Furthermore, there was also a widespread lack of responsibility and accountability for improvement. As discussed earlier, length of stay is expressed as a ratio of the observed length of stay to the expected length of stay. Instead of focusing on patient value and finding ways to improve the observed length of stay, which has a direct impact on patient safety and satisfaction and is in line with the vision statement of HealthCo, nearly every team tried to focus on the expected length of stay, which involved changing the way diagnoses were

coded to reduce the ratio. This reluctance to act for the best interest of the customer, instead choosing to superficially reduce the length of stay index by increasing the expected length of stay, reflects that the Lean culture was not well developed. In a true Lean culture, all decisions would be made to benefit the customer and increase value through their eyes. At the onset of the management-led problem solving activities, this was not the case.

The next issues that arose were related to data. Firstly, the data necessary to analyze the problem could only be accessed by a select group of people involved in the problem solving teams. This meant that without the participation of these select few people, it was difficult to move forward with analysis. This again reflects a poor culture and a lack of data availability to make real time decisions when addressing problems. Secondly, data analysis, especially in Step 2 of the 8-Step Problem Solving method, can be arduous and time consuming, much to the dismay of those involved in the process. Jishuken activities are not instantaneous improvements and should not be expected to be completed quickly (Marksberry et al, 2010). Despite this fact, transformation leadership felt uneasy about the time that was being consumed with data analysis and the lack of results that were being realized through the problem solving process. At Toyota, the company who owes much of their success to the 8-Step method, the plan stage, which involves the data analysis in Step 2 of the method, is one of the most emphasized portions of the process (Marksberry et al, 2011). However, at HealthCo, the decision was made to decrease the emphasis on breaking down the problem in Step 2 and instead encourage teams to move forward with the problem solving based on where they felt a problem existed. Though this method still involved some data analysis, the tediousness with

which Toyota emphasizes the problem breakdown would no longer be the practice. This method did speed up the problem solving process and helped teams to arrive at results more quickly, but it also sacrificed the process thinking in order to realize results. In a true Lean environment, and at Toyota, process thinking must lead the organization, and positive results will come as a consequence of developing thorough processes. At HealthCo, the effectiveness of the 8-Step process was sacrificed to more quickly realize results.

To further encourage results and gain more interest and participation from team members, a decision was also made to emphasize small cycles of change when developing countermeasures to eliminate the root cause of each team's problems. Traditionally at Toyota, the action portion of the 8-Step Problem Solving method is the least emphasized from management's perspective (Marksberry et al, 2011). By encouraging small cycles of change, the hope was that the teams would better be able to judge the effectiveness of their countermeasures and more quickly implement them to begin realizing results. Though this did not greatly change the 8-Step process, it does again demonstrate a leadership and organizational culture that is more results oriented, rather than process focused.

Though the changes made to the 8-Step process during management-led problem solving activities were not consistent with the practices at Toyota, positive results were found from the problem solving efforts, though the level of sustainability of the improvements will only be seen with time. Furthermore, it is difficult to tell which changes led to the improvements, as groups were encouraged to enact many small cycles of change to generate results throughout the problem solving process. As an

organization, HealthCo has realized a 7.4% reduction in length of stay since the onset of the management-led problem solving groups. A detailed breakdown of reductions in length of stay by area, as of March 2013, is shown in Figure 5.8.

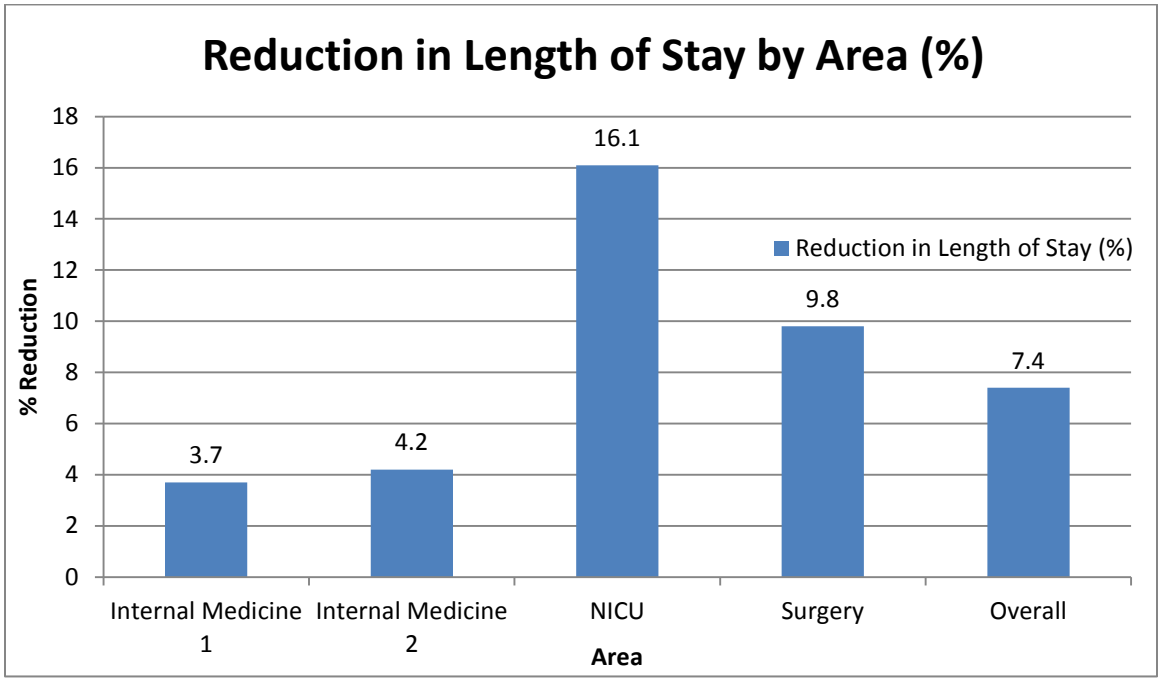


Figure 5.8: Reduction in patient length of stay by area as of March 2013.

A second group assembled as a result of management problem identification at HealthCo addressed patient falls. The falls group was made up of nursing leadership and management, along with staff nurses. The falls group followed the traditional 8-Step approach and took much longer than the length of stay groups to analyze the data and break down the problem. The group has worked for over seven months and is in the process of implementing countermeasures. As no countermeasures have been fully implemented, no results have been demonstrated.

Managers outside of Toyota often feel that the pace of the 8-Step Problem Solving method is slow, and they feel pressured to rush through the process and

accelerate the steps in order to get results (Marksberry et al, 2011). Based on actions taken in the management-led problem solving activities at HealthCo, it appears that this was also the case. An analysis of the progress in management-led problem solving activities at HealthCo can be found in Figure 5.9. The analysis is based on an overall progress from the onset on implementation in January 2012 through March 2013.

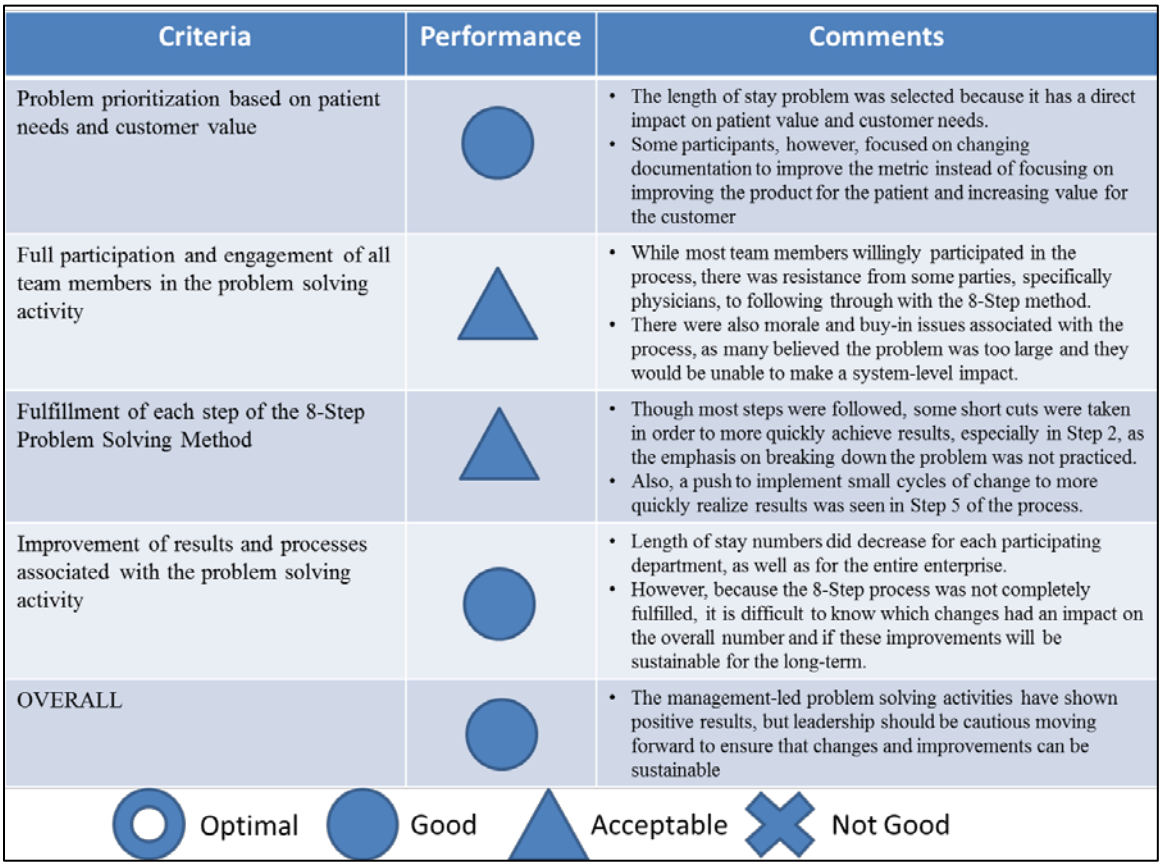


Figure 5.9: Analysis of management-led problem solving activities as of March 2013.

5.6 Analysis of Education and Training

As discussed in previous sections, as part of the Lean transformation, HealthCo moved to develop health care related instructional material to teach 8-Step Problem Solving to staff throughout the enterprise in Flight Trainings. During these Flight Trainings, participants work through the 8-Step method utilizing a real enterprise

problem from HealthCo. Groups are facilitated by Purple2 and Purple3 and are coached on appropriate methods for completing 8-Step Problem Solving. The importance of standardization is also a tenet of Toyota's practice (Marksberry et al, 2011). In the Flight Training sessions, the facilitators stress the importance of standardization and encourage the development of standardized work during the problem solving process.

Training employees in Lean methods is an effective way to spread Lean, but attempting to train everyone in Lean before implementation may mean that an organization will never be ready to start a transformation (Parks, 2002). Knowing this, a major concern for problem solving training is whether to train only a select few employees in the methodology, such as in the model area NICU, or to roll out the method enterprise wide, teaching employees across all departments the 8-Step method, even if it means they will not have the direct support required to make improvement efforts sustainable. At HealthCo, the decision was made to roll out the training enterprise wide. Specifically, Green2 chose to send all nursing managers from throughout the enterprise to the problem solving Flight Training. However, utilizing an enterprise wide roll out methodology may spread resources too thin, leaving many problem solving efforts throughout an enterprise unsupported and unsustainable. In one Lean transformation meeting, Orange4, the director LeanCo and a Toyota executive, suggested that a better approach would be to focus 8-Step training and activities in the model area NICU while continuing the old problem solving method that was in use throughout the enterprise everywhere else. By doing an enterprise wide roll out, resources would be taken from the model area, inhibiting its growth and progress. However, in the end, the enterprise wide Flight Training initiative was enacted, and the expectation was that all nurse managers

from throughout the organization would complete the training and begin to standardize the process in their areas.

Flight Trainings have experienced many issues throughout their development. Initially, the training sessions were conducted in the Jishuken room. However, as discussed previously, conflicting meetings and space constraints forced the trainings to other locations, usually not staying in the same location throughout the four day training. Often, the site of the training sessions were not even on the HealthCo campus, seriously inhibiting the ability of the participants to genchi genbutsu and see the problems where they occur, a vitally important practice in the 8-Step method. Ideally, the Jishuken room would be dedicated to the Flight Training for the entire duration of the course in order to ensure maximum gains for the participants.

Another issue that has plagued the Flight Trainings is an inability to get team members to follow through on completing their projects. Many participants are assigned projects that are not related to their work, and therefore have little interest on following up on them after the training has completed. This issue arises from a basic question that was never addressed by leadership when planning the Flight Trainings: Are these problems being used strictly for training purposes, or is it expected that the problems will be solved at the end of the training? To address this issue, leadership determined that it was important for the problems to be solved as well as serving to educate participants on the process. To fix this issue, leadership moved to appoint process owners to each problem, so, after completion of the course, team members could hand off their findings to someone who was tied to the work and would follow through on completing the process.

Furthermore, there has been very little physician involvement in the Flight Trainings, as demonstrated in Table 4.7. Many physicians claim that the four day training is simply too much time to commit with their schedules, which makes it impossible for them to attend. However, it is crucial to have involvement from all parties to ensure one voice throughout the enterprise and standardize Lean methodologies and philosophies. Without physician participation, HealthCo is missing a major component of its employee population. To mitigate this, the leadership team has explored other options for training, such as abbreviated Flight Trainings and spreading the training over several weeks, though no methodology has been put in place as of yet to boost physician involvement in training.

The material for teaching the 8-Step Problem Solving method at HealthCo has changed to reflect the changes in philosophy discussed earlier; decreased emphasis on data analysis and breaking down the problem and increased emphasis on small cycles of change and getting results from countermeasures. Again, this practice suggests cultural issues, as it is important during a Lean transformation to move from results-focused thinking to process-focused thinking. Sacrificing the process to achieve results may lead to unsustainable improvements, culture issues, and failed implementation.

Finally, as HealthCo is early in the transformation to Lean, problems often do not have a well-defined standard for which they are not meeting. When doing problem solving, it is important to develop standards before trying to improve or kaizen a process. At HealthCo, before attempting to solve a problem in the Flight Trainings, it may be useful to establish a standard first, communicate it with those effected, and then move forward with problem solving when it is recognized that the standard is not being met.

As mentioned, there is great concern with the ability to support the growing number of problem solving activities at HealthCo with the limited number of resources who are qualified to facilitate them. Currently, Purple2 and Purple3 are responsible for facilitating and supporting the all problem solving activities at HealthCo. Figure 5.10 shows the growth of the number of active problem solving activities since the onset of implementation through February, 2013. It should also be noted that none of the problem solving activities at HealthCo have been completed through Step 8. An analysis of the education and training can be found in Figure 5.11. The analysis is based on an overall progress from the onset on implementation in January 2012 through March 2013.

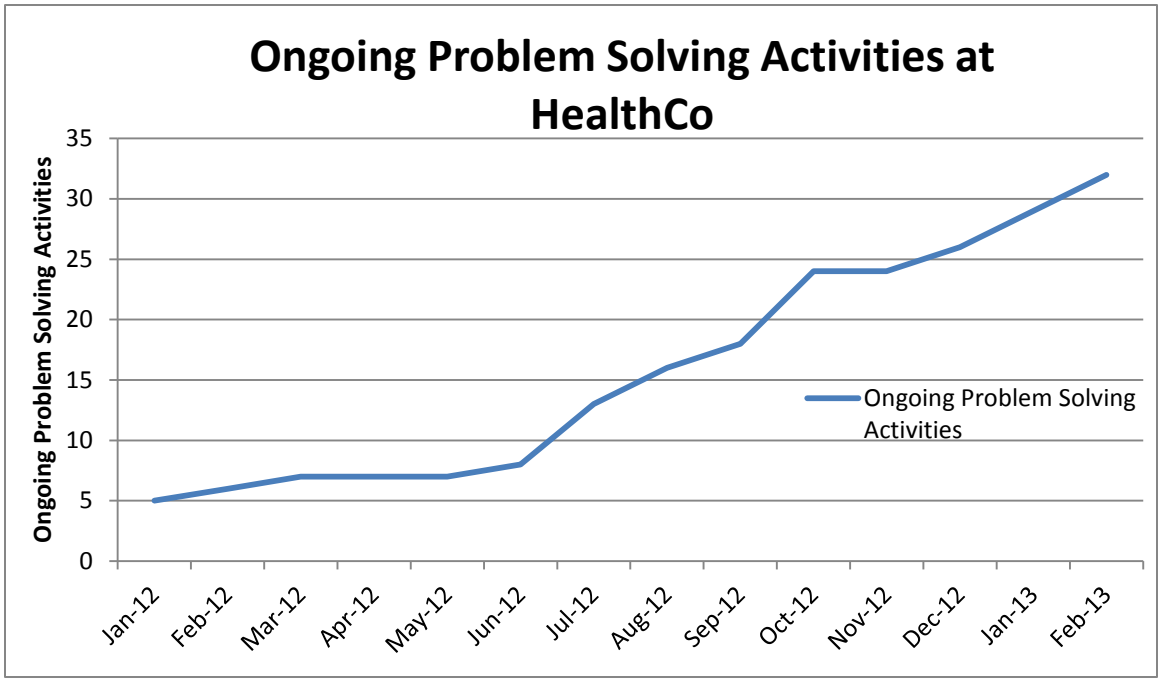


Figure 5.10: Ongoing problem solving activities at HealthCo as of February 2013.

Criteria	Performance	Comments
Effective method for training team members in Lean methodologies and 8-Step Problem Solving		• The flight training sessions are an appropriate method for demonstrating Lean concepts to team members through hands-on learning experience. • At the completion of the training, team members have a basic knowledge in Lean tools from the simulation and 8-Step Problem Solving from the real-life problem that they have worked on.
Full participation and engagement of all team members in the problem solving activity		• A majority of the participants in the problem solving flight training come from nursing, IT, or other services. • There is very little physician involvement in team member training courses or activities.
Proper resources to have a dedicated space to complete the training sessions.		• Space issues plague the problem solving flight trainings as there is no room dedicated to house the training sessions. • Participants typically have to move from room to room throughout the course of the training to complete their problem solving activities.
Communication of transformation philosophies, practices, and one voice materials		• At the onset of each training session, time is spent by the facilitator to familiarize the participants with HealthCo philosophies and the vision for the transformation
OVERALL		• The training sessions are successful at demonstrating Lean tools and philosophies to team members, but work must be done to include physicians in the training sessions and find a dedicated location to house the sessions.

Figure 5.11: Analysis of training methods as of March 2013.

5.7 Analysis of Culture Development

Studies have shown that, in truly Lean organizations, management and leadership should value the cultural aspects of Lean, while shop floor employees have a greater value for the continuous improvement tools (Badurdeen et al, 2010a). At HealthCo, there is still work to be done to develop the culture that is necessary to sustain a Lean implementation. Currently, a culture still exists that is driven by results instead of processes. This culture is one where improvements are driven downward from management with little involvement or input from floor level workers, as opposed to a culture of open communication where leadership teaches Lean principles and philosophies to employees and workers communicate ideas for methods and procedures to improve their work to management. These facts were demonstrated in the morale and buy-in issues that were experienced in the model area development. Also, adherence to

the Lean practices, which are the backbone of the Lean culture at HealthCo, can be examined in Figure 5.1. Moving forward, HealthCo leadership must do more to establish one voice and a culture that is conducive to change and employee involvement. This culture building will be paramount to future successes for the Lean transformation. An analysis of the cultural development at HealthCo can be found in Figure 5.12. The analysis is based on an overall progress in culture development from the onset on implementation in January 2012 through March 2013.

Criteria	Performance	Comments
Trust in management and leadership throughout the organization		• Trust in management still needs to be established throughout the organization. • In the model area, specifically, trust issues were communicated by those involved in the transformation. Staff did not believe that there was a commitment from above for the change. • The layoffs that were endured during the onset of transformation could have had an impact on staff morale and led to trust issues. • Front-line staff also felt that management was not supplying them with the resources needed to be successful.
High level of volunteerism for improvement projects and training initiatives		• There was little volunteering by staff to join improvement projects or training initiatives. Most attended training or were involved in improvements because it was part of a management initiative.
High morale and team spirit throughout the organization		• Moral issues exist within the organization, and specifically in the model area. • Staff cite resource and staffing issues as part of the cause to these morale issues in the model area.
Communication of transformation philosophies, practices, and one voice materials		• Facilitators make an effort to communicate the goals and strategies of the organization in an effort to create one voice for change throughout the organization, though they are limited to communicating these visions with those who participate in training sessions or transformation meetings.
Utilization of problem solving and a safe environment to point out problems so that they can be addressed		• An andon system does not exist for real-time problem identification, nor does real-time data capabilities. • Problem solving is being utilized by those who have been trained in the methodology, but it still has not taken root as a way of thinking within the organization or the model area.
Consistent training throughout the organization		• Standardized flight training methods have been developed to train staff in 8-Step Problem Solving throughout the organization. • More training materials must be developed to continue to relate Lean principles to the health care environment.
OVERALL		• A culture of change and continuous improvement does not yet exist in HealthCo, though leadership has taken the time to develop one voice materials. • More must be done to develop the culture, build employee morale, and encourage problem identification and problem solving in order to move forward with a successful Lean implementation
		

Figure 5.12: Analysis of culture development.

6: LIMITATIONS AND RECOMMENDATIONS

This study utilized qualitative observational data and direct involvement in transformation activities to gather data for transformation analysis. Ideally, quantitative survey information would have been gathered from HealthCo employees, especially those front line workers in the model area. However, because of limited access to HealthCo NICU employees, and limited access to those involved in the leadership transformation team, quantitative survey data would have revealed little information outside of what was already qualitatively gathered. Furthermore, in analysis, there was opportunity for the misinterpretation of the qualitative findings, though all efforts were taken to ensure no misinterpretation was represented in this paper.

This study focused on a broad view of Lean transformation at a health care institution, and future studies may be needed to investigate the components individually. Specifically, based on the outcomes observed in this study, research specific to model area and cultural development should be considered. The model area at HealthCo was ultimately unsuccessful and it would be useful to complete a more in depth study of what components and attributes create a successful model area deployment. Furthermore, as the culture development at HealthCo has been less than ideal, as is common in many companies undergoing Lean transformation, the development of a framework for cultural development would be useful.

As companies, specifically in health care fields, experience more and more pressure to reduce costs while improving quality and safety in the future, it will be essential to continue to investigate methods for successful enterprise Lean transformation. This study was simply a documentation of transformation efforts at one

institution, but more work must be done to develop a structure or algorithm for implementing Lean in any enterprise in future research, as well as characteristics that inhibit the ability of an organization to implement Lean.

7: CONCLUSIONS

At the time of Toyota's development of TPS, they faced scarce resources and a poor economy that were pressuring them for improvement – a similar situation to the one that health care faces today (Johnson et al, 2012). And, like manufacturing, in health care the stakes are high for realizing improvement in quality, safety, customer satisfaction, and productivity, though experts believe that it may take years to truly transform the health care industry (IHI, 2005, Johnson et al, 2012).

HealthCo has started their journey to Lean transformation through a three-phased approach: model area development, management-led problem solving activities, and staff education and training. Throughout their journey, HealthCo has faced layoffs, loss of critical team members, and cultural issues; similar to roadblocks that other companies face during Lean transformation. HealthCo found their first attempts at model area development unsuccessful, though progress has been made in management-led problem solving activities and employee training and education. A lack of leadership involvement has damaged employee buy-in to the change and hindered culture development, which has thus far been insufficient to support Lean transformation. If successful implementation is to be realized in the future, more work must be done to ensure one voice is established throughout the enterprise and a culture is developed, in alignment with enterprise goals and values, which encourages those doing the work to improve their own work through problem solving with support and training from management. If transformation leadership can apply lessons learned during initial transformation efforts while working endlessly to establish a Lean culture, a true Lean environment may be

established throughout the HealthCo enterprise, ultimately leading to increased performance, staff satisfaction, safety, and patient satisfaction.

APPENDIX A: Simplified HealthCo Organizational Chart

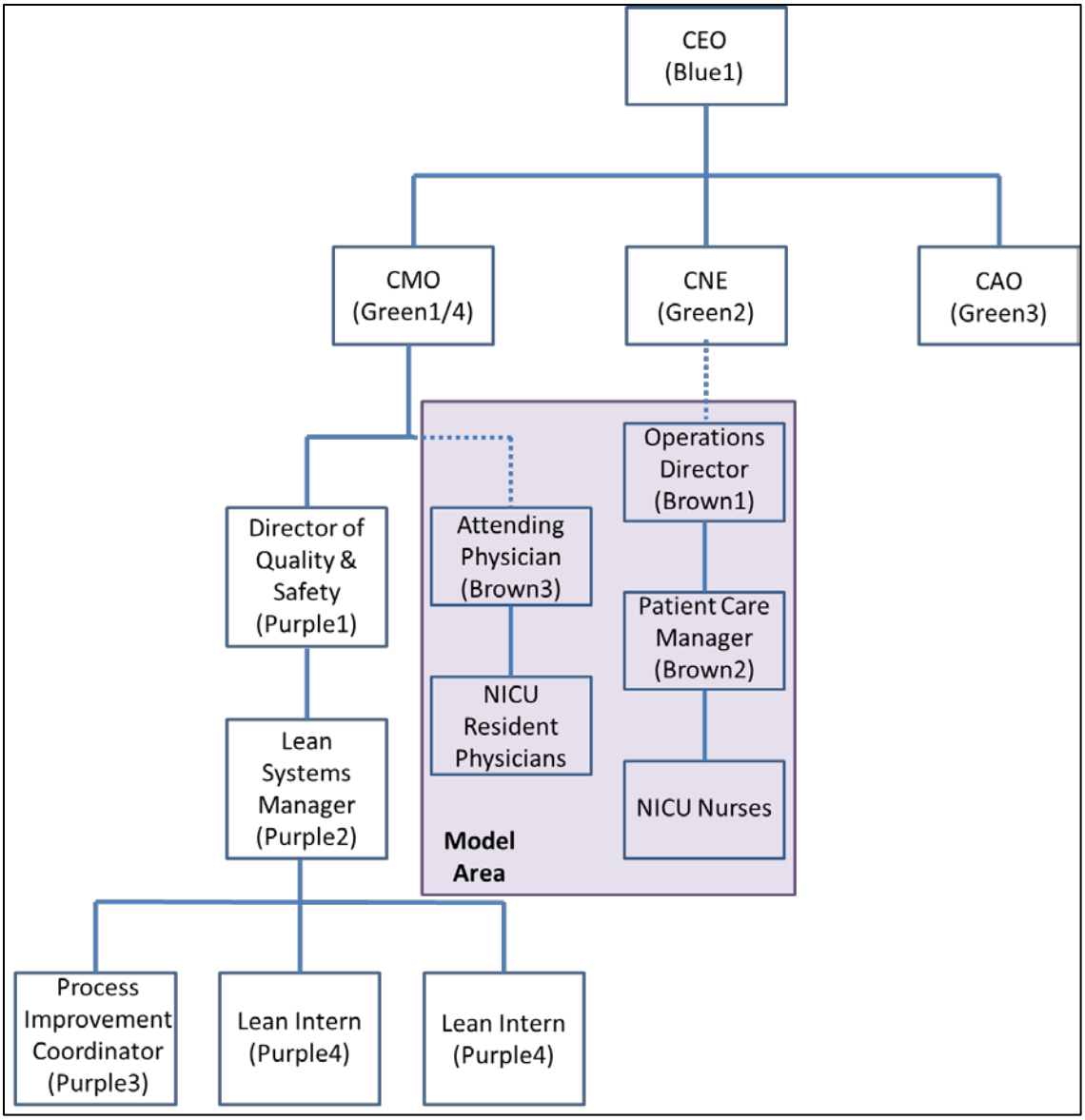


Figure A.1: HealthCo generalized organizational chart.

APPENDIX B: HealthCo Transformation Plan

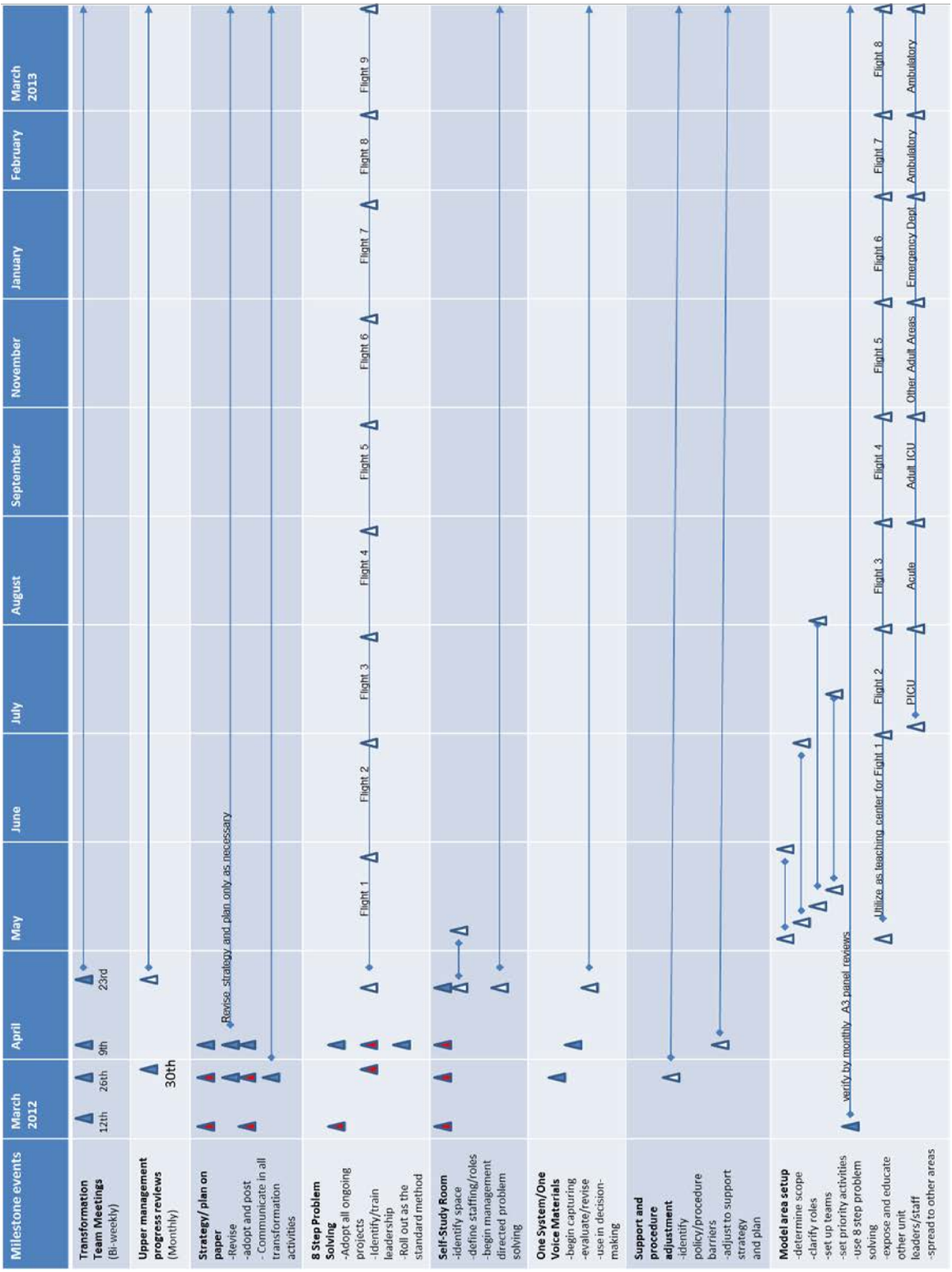


Figure B.1: Implementation plan for first year of implementation.

Figure B.2: Implementation plan for second year of implementation.

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