Lean Healthcare Student Handbook

RE-THINKING HEALTHCARE

IMPROVING PATIENT CARE THROUGH DESIGN

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Lean Overview

Lean management principles have been used effectively in manufacturing companies for decades, particularly in Japan. The Institute for Healthcare Improvement believes that Lean principles can be — indeed, already are being — successfully applied to the delivery of health care.

Lean thinking begins with driving out waste so that all work adds value and serves the customer's needs. Identifying value-added and non-value-added steps in every process is the beginning of the journey toward Lean operations.

In order for Lean principles to take root, leaders must first work to create an organizational culture that is receptive to Lean thinking. The commitment to Lean must start at the very top of the organization, and all staff should be involved in helping to redesign processes to improve flow and reduce waste.

Although health care differs in many ways from manufacturing, there are also surprising similarities:

> Whether building a car or providing health care for a patient, workers must rely on multiple, complex processes to accomplish their tasks and provide value to the customer or patient. Waste — of money, time, supplies, or goods — decreases value.

The concept called "Lean management" or "Lean thinking" is most commonly associated with Japanese manufacturing, particularly the Toyota Production System (TPS). Much of the TPS way of thinking is based on the work of quality guru W. Edwards Deming, who taught, among other things, that managers should stop depending on mass inspection to achieve quality and, instead, focus on improving the production process and building quality into the product in the first place.

Lean "Thinking"

So what does "Lean thinking" mean? Simply put, Lean means using less to do more. Lean thinking is not typically associated with health care, where waste — of time, money, supplies, and goods — is a common problem. But the principles of Lean management can, in fact, work in health care in much the same way they do in other industries.

Lean thinking is not a manufacturing tactic or a cost-reduction program, but a management strategy that is applicable to all organizations because it has to do with improving processes. All organizations — including health care organizations — are composed of a series of processes, or sets of actions intended to create value for those who use or depend on them (customers/patients).

The core idea of Lean involves determining the value of any given process by distinguishing value-added steps from non-value-added steps, and eliminating waste (or "Muda" in Japanese) so that ultimately every step adds value to the process.

To maximize value and eliminate waste, leaders in health care, as in other organizations, must evaluate processes by accurately specifying the value desired by the user; identifying every step in the process (or "value stream," in the language of Lean) and eliminating non-value-added steps; and making value flow from beginning to end based on the pull — the expressed needs — of the customer/patient.

When applied rigorously and throughout an entire organization, Lean principles can have a dramatic effect on productivity, cost, and quality. Every organization wants to provide high quality products and services. Hospital systems by their nature must provide high quality and safe services. Society expects this to be true.

The major precepts of "Lean Thinking" include:

Leadership: Introducing Lean thinking in an organization is, in the words of those who have done it, not for the faint of heart. It cannot be done piecemeal, but must be a whole-system strategy. There is no single "silver bullet" solution such as a new computer system or automated equipment that will achieve the same results. It cannot be done only by middle managers or frontline workers; those at the very top of the organization must lead it.

Implementing Lean thinking requires major change management throughout an entire organization, which can be traumatic and difficult. Strong commitment and inspiring leadership from senior leaders is essential to the success of an effort *this* challenging. The CEO must be a vocal, visible champion of Lean management, create an environment where it is permissible to fail, set stretch goals, and encourage "leaps of faith." A senior management team that is aligned in its vision and understanding of Lean is a critical foundation for "going Lean."

Culture: A Lean culture is the backdrop against which Lean tools and techniques are implemented. That culture differs in some significant ways from a traditional culture in business, as well as in health care.

Traditional Culture	Lean Culture
Function Silos	Interdisciplinary teams
Managers direct	Managers teach/enable
Benchmark to justify not improving: "just as good"	Seek the ultimate performance, the absence of waste
Blame people	Root cause analysis
Rewards: individual	Rewards: group sharing
Suppliers is enemy	Supplier is ally
Guard information	Share information
Volume lowers cost	Removing waste lowers cost
Internal focus	Customer focus
Expert driven	Process driven

An organization's culture is the set of values and beliefs that cause people to behave in certain ways. When they behave that way and get the results they expect, it reinforces those values and beliefs. This self-reinforcing cycle creates a culture.

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Leaders who wish to change their organizational culture cannot do so by edict. They must intervene and require people to behave differently, allowing them to experience a better set of results. As this process is repeated, a different set of values and beliefs — a new culture — will evolve.

One of the challenges of implementing Lean in health care is that it requires people to identify waste in the work in which they are so invested. All workers want to feel their work is valuable, perhaps most especially health care workers. Recognizing that much about their daily tasks is wasteful and does not add value can be difficult for health care professionals. A nurse who is hunting for supplies is doing it to serve the needs of patients. Nurses may not see this as wasted time, and may not stop to wonder why those supplies aren't where they need them every time they need them. But if the supplies were always readily available, the time nurses spend hunting for them would instead be devoted to something more appropriate to their skills and expertise.

To help staff see and embrace the promise of Lean, leaders must create a clear vision statement that guides people to make the right choices. They must evaluate the organizational structure and work to flatten it, eliminating hierarchical layers and organizing staff into operational teams based on products or services.

Conclusion

Lean management is not a new concept, but it is relatively new to health care. While skeptics are right when they say, "Patients are not cars," medical care is, in fact, delivered in extraordinarily complex organizations, with thousands of interacting processes, much like the manufacturing industry. Many aspects of the Toyota Production System and other Lean tools therefore can and do apply to the processes of delivering care.

Courageous, forward-thinking health care organizations are leading the way by demonstrating that Lean management can reduce waste in health care with results comparable to other industries. Leaders of these organizations emphasize the importance of creating an organizational culture that is ready and willing to accept Lean thinking.

Without a receptive culture the principles of Lean will fail.

Lean management and operations tools can be applied successfully to health care. Lean principles hold the promise of reducing or eliminating wasted time, money, and energy in health care, creating a system that is efficient, effective, and truly responsive to the needs of patients — the "customers" at the heart of it all.

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Lean Concept: What is Quality?

There are many short definitions of quality, including "fit for purpose," "meeting customer expectation," and "doing things right the first time every time." Any useful definition of quality must incorporate these two dimensions that drive customer satisfaction and dissatisfaction:

1. You must provide the "**features**" that satisfy needs

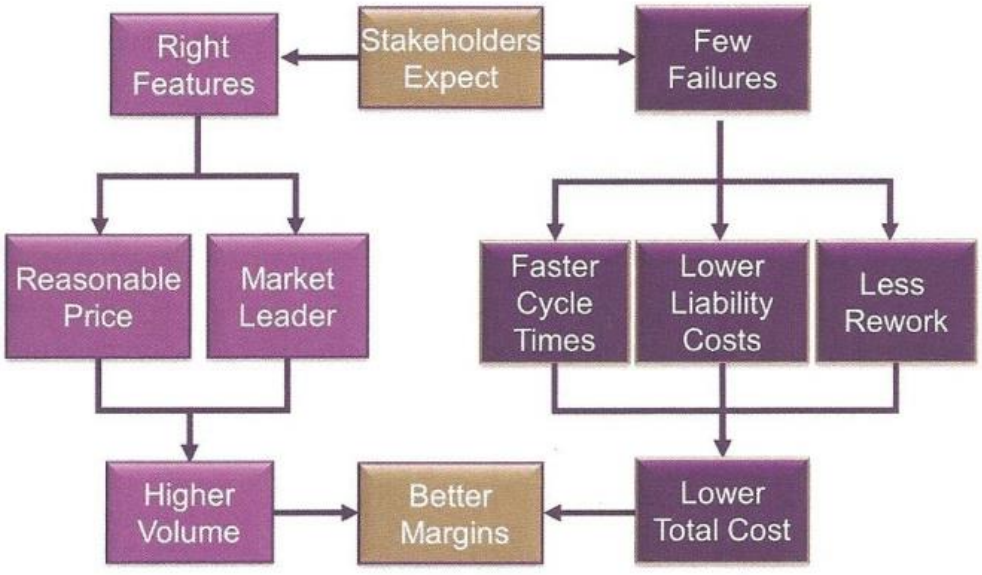
   Well-designed processes create customer satisfaction because they provide the features or characteristics within services that customers need. Customer satisfaction is a high priority for any organization because customers continue to use the services that meet their needs.

   The better an organization meets customer needs by providing the right combination of desirable features, the higher its revenue will be. This happens because the organization will attract more customers. At the same time, providing more features will usually cost more.

2. You must provide the services while being "**free of failure.**"

   Process failures create customer dissatisfaction. They are also costly to an organization because mistakes must be identified and corrected, and the customer must be appeased. Additionally, the original work is wasted. All these costs can be trimmed when quality is improved by reducing failures.

Quality and the Bottom Line



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Customers

Customers are all those affected by your work, thus they ultimately define quality for you. It is helpful to look at customers from two perspectives:

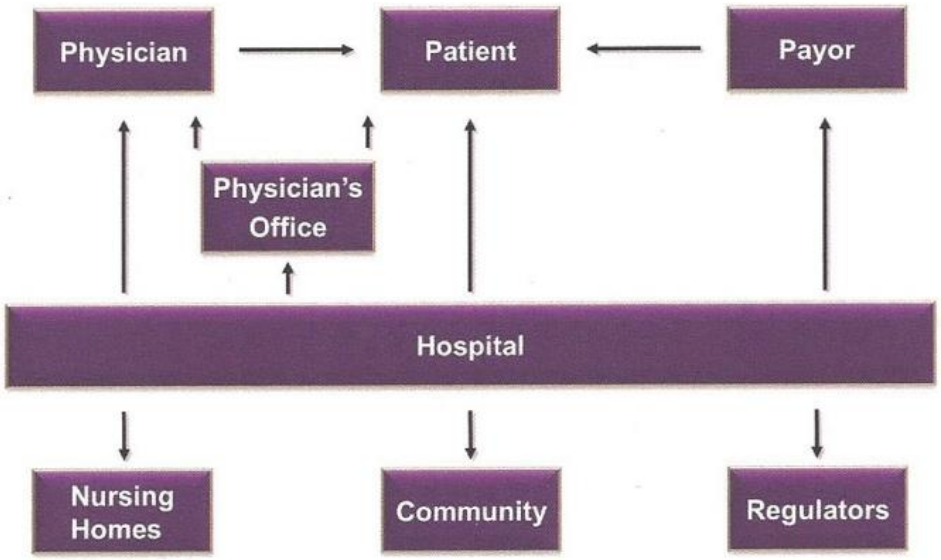
- External customers
- Internal customers

External Customers

External customers are not a part of the organization providing a particular product or service. While the obvious external customers of any healthcare organiztion are patients, there are other customers as well. The chart below shows some other external customers for a hospital, such as a third-party payors – insurance companies, employees, or governmental agencies – who pay the bills for most patients. Various regulators (such as the Joint Commission) and governmental agencioes are also customers.

An immediate external customer is not always a final customer. For example, when a physician's office calls a hospital to schedule a surgical procedure, the individual in the physician's office who make the call is the immediate customer. The next customer is the surgeon, and the final customer is the patient for the scheduled surgery. The surgeon and the patient are, at other itmes, immediate customers for the hospital's services.

External Customers



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Internal Customers

Internal customers are those within your organization who are affected in some way by your work. Satisfying external customers requires that you also satisfy the needs of our internal customers.

Example:

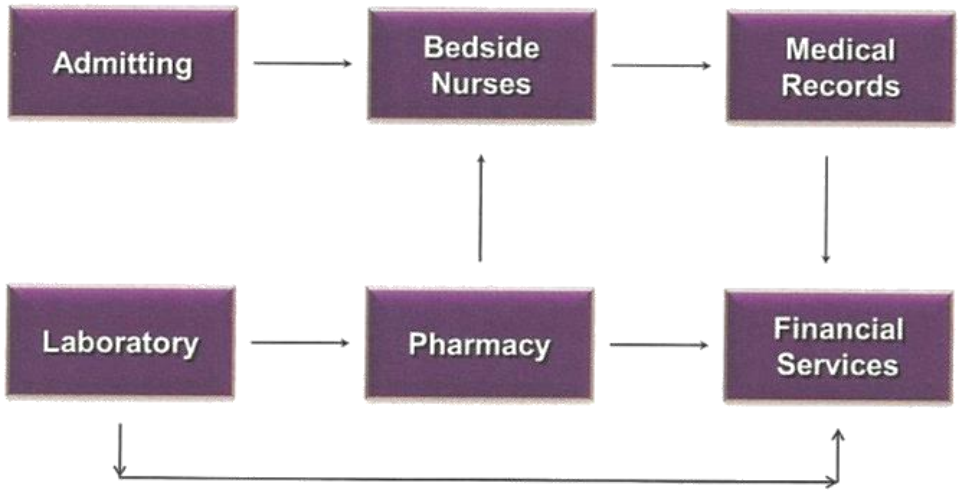
The chart below shows some of the many internal customer relationships in a hospital. For example, when providing medication to a patient, the Bedside Nurses are internal customers of the hospital's Pharmacy Department. The Pharmacy is the supplier to the Bedside Nurse. Nurses need to have medication delivered at the right time, in the correct form, and the correct dosage. The patient's needs cannot be met unless the related needs of the nurses are also satisfied.

Customer: Bedside Nurse

Internal customer needs to be met: The correct medication at the right time, in the correct form, and the correct dosage

Supplier: Pharmacy to the Bedside Nurse

InternInternal Customers

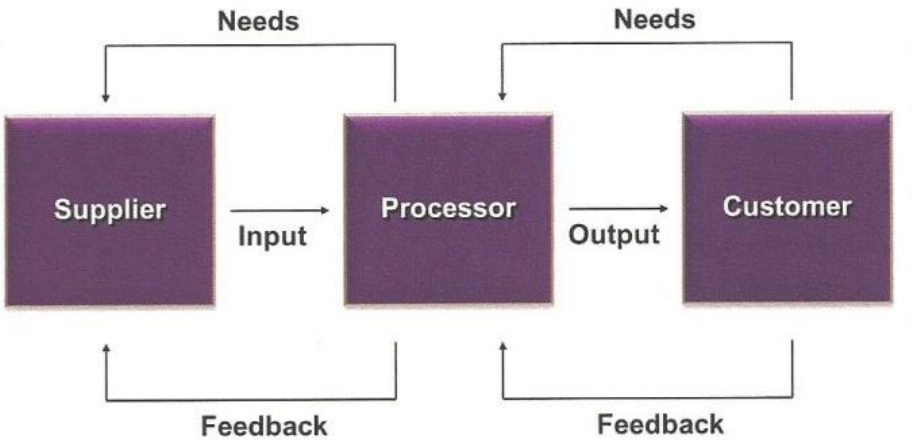


A Triple Role

As a member of a healthcare organization, you are part of a process dedicated to delivering quality healthcare. Patient health and satisfaction depend on many chains of internal supplier/processor/customer relationships. To meet the needs of your ultimate customers, you must fulfill three roles:

- Supplier
- Processor
- Customer

Notes:



Triple Role Supplier

You are a supplier in the healthcare delivery process. Your success in this role depends on how well you satisfy those who depend on you. Therefore, you need to:

- Known who your customers are.
- Understand your customers' needs.
- Obtain feedback from your customers.
- Avoid creating problems for your customers.

Processor

You are probably most comfortable in your role as a processor. This is what you are trained for as a physician, nurse, radiology technician, computer systems analyst, secretary, cook, or administrator. To fulfill your role as a processor, you need to:

- Plan your work to meet customer needs.
- Control your work to meet customer needs.
- Improve your work based on customer feedback.

Customer

You are a customer to many of your co-workers. Your effectiveness in fulfilling your customer role depends on how successfully you obtain what you need from others. As a customer you need to:

- Communicate your needs to suppliers.
- Provide feedback to suppliers.

Not long ago, the concept of quality simply meant the absence of defects from a manufactured physical good (product). In healthcare, quality tended to be limited to established standards for structure and process in clinical care services. It is not

realized that this “limited quality” or “little q” view restricts your ability to delight your customers. To succeed today, you need to expand your approach to one of “Total Quality” or “Big Q.”

Total Quality (Big Q) means:

- Customers are all those affected by what you do.
- Products include both goods and services.
- Processes include all functions.
- Clinical care services.
- Service to all customers.
- Support services.
- Business operations.

Notes:

Lean Concept: The Eight Wastes

1. **Overproduction** – making or doing more than is required or earlier than needed
    a. What is the minimum quantity the customer needs?
    b. When do they need it?
    c. What is the minimum order, quantity, or lot size?
2. **Waiting** - for information, materials, people, maintenance, etc.
    a. Any wait-time is waste.
    b. Look to eliminate or minimize by ensuring that items arrive only when they are truly needed.
3. **Transport** – moving people or goods around or between sites
    a. Although some is necessary, this is also pure waste.
    b. Calculate the amount of travel distance and number of time items, materials, and work in process (WIP) are moved per day.
    c. Look to minimize distance or number of daily moves.
4. **Poor process design** – too many/too few steps, non-standardization, inspection rather than prevention, etc.
    a. This is attacked through VE/NVA analysis.
    b. U-shaped cells and moving areas in close proximity.
    c. Standardize on a size (i.e. using same screw size for all assemblies).
    d. Design to eliminate inspection.
5. **Inventory** – work-in-progress, papers, electronic files, etc.
    a. Calculate days of supply for all goods.
    b. Understand how long it takes to replenish each item (more frequent supplies means less inventory).
    c. Develop strategy for the amount of supply to keep.
6. **Motion** – inefficient layouts at workstations; poor ergonomics in offices
    a. Motion requires detailed analysis of movements.
7. **Defects** – errors, scrap, rework, non-conformance
    a. Any defect is waste.
    b. Use Pareto Analysis to identify key defect reasons.
    c. Need to understand causes of the errors – use cause-effect diagram.
    d. Look to eliminate all causes through mistake proofing.
8. **Underutilized personnel resources and creativity** – ideas that are not listened to, skills that are not utilized

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Lean Concept: Lean Implementation (Roles)

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The first step in mobilizing for breakthrough is to establish the infrastructure that will best support quality improvement. The first task is to create the organization's Executive Steering Committee. The basic responsibility of this committee is to launch, coordinate, and institutionalize annual breakthrough. This committee can also be called a Quality Council.

One of the responsibilities of the Executive Steering Committee is to select projects. For each selected project, a Champion, Deployment Leader, Team Leader and team are assigned. This team then becomes responsible for completing the projects. Why a multifunctional team? The most important projects are the vital few, and they are almost always multifunctional in nature. The symptoms typically show up in one department, but there is no agreement on where the causes lay, what the causes are, or what solutions should be implemented. Experience has shown that the most effective organizational mechanism for dealing with such multifunctional problems involves multifunctional teams.

Executive Steering Committee

The Executive Steering Committee consists of the CEO and direct reports. The council is responsible for leading the organization's quality and safety initiatives.

Key Roles of the Executive Steering Committee

1. Formulate the policies, such as: Focus on the customer has top priority, breakthrough must go on year after year, participation should be universal, or the reward system should reflect performance breakthrough.
2. Understand current quality performance compared to competitors, the extent of chronic waste, the adequacy of major business processes, or the results achieved by prior breakthroughs.
3. Establish processes for selecting projects, such as soliciting and screening nominations, selecting projects, preparing goal statements, or creating a favorable climate for breakthrough.
4. Establish processes for carrying out the projects, such as selecting team leaders and members, or defining the role of project teams.
5. Provide support for the project teams, such as training time for working on projects or facilitator support.
6. Establish measures of progress, such as effect on customer satisfaction or financial performance, or extent of participation by teams.
7. Review progress, assist teams in the event of obstacles, and ensure that solutions are implemented.
8. Provide for public recognition of teams.
9. Establish a reward system to reflect the changes demanded by introducing annual breakthrough.
10. Ensure appropriate communication of breakthrough performance to key stakeholders, such as the full Board, Quality Board, employees, medical staff, and community leaders.

The committee may establish sub-councils whenever it is necessary to do so in order to facilitate the efficient operation of the Executive Steering Committee.

Deployment Leader

The Deployment Leader is responsible for the development, execution, and monitoring of the quality improvement deployment plan.

Key Roles of the Deployment Leader

1. Participate in system-level strategic quality planning with the Executive Steering Committee.
2. Identify performance opportunities that are crucial to meeting strategic goals, and assist with project selection.
3. Serve as liaison to the Executive Steering Committee, Champions, Process Owner, Team Leaders, and project teams.
4. Design for quality and develop the quality deployment plan.
5. Be a master resource on quality improvement methods and tools.
6. Provide overall project management.
7. Oversee the design, development and reporting of process scorecards.

The Deployment Leader must undergo Lean Six Sigma training to ensure a ground level of competency in basic concepts and tools. The Deployment Leader may be the team leader or member of a project team.

Champion

Champions are management representatives that will drive implementation within a department, function, or process. Champions are not just from management; they are those who want to demonstrate the benefits of Lean Six Sigma and are willing to take a risk to achieve the intended results. Champions are viewed as the leaders of the initiatives.

Key Roles of the Champion

1. Perform a key role in the organization's business strategy to drive down costs and increase revenue and profitability.
2. Identify individuals to perform in a Quality Improvement Leadership role.
3. Select projects (and charters) critical to meeting goals.
4. Write the project charter and select the right project leader(s) and team members.
5. Understand the use of quality improvement methods and tools.
6. Mentor and advise peers on prioritizing, planning, and launching projects.
7. Provide management, leadership, support, and mentoring to project leaders.
8. Remove organizational obstacles that may impede the work of the improvement teams.
9. Approve and support implementation solutions to business processes.
10. Ask probing and challenging questions.

Notes:

11. Provide recognition and reward to the project teams upon successful completion of their projects.
12. Communicate to the Executive Steering Committee and peers about progress and results associated with their performance improvement projects.

Champions are strongly urged to undergo Lean Six Sigma training to ensure a ground level of competency in basic concepts and tools. Champions are not part of a core project team.

Process Owners

The process owner is a business manager with primary responsibility for the on-going performance of the business process being improved.

Key Roles of the Process Owner

1. Participate on the team of the process being improved.
2. Commit to:
    a. Helping teams understand the current process
    b. Implementing proven solutions
    c. Maintaining the process at the Control Phase
3. Institutionalize team-developed procedures, standard work, forms and other tools.
4. Hold the gains on improvement, ensure monitoring of results, and report metrics to Executive Steering Committee.
5. Maintain all project documentation at the completion of the project.

Process Owners are strongly urged to undergo Lean Six Sigma training to ensure a ground level of competency in basic concepts and tools. Process Owners may be part of the core project team.

Lean Expert and Black Belt

Lean Experts and Black Belts are technical specialists assigned full responsibility to implement Lean Six Sigma projects through a business unit, function, or process. They will become viewed as initiators of improvement activity, and are full-time on-site project leaders.

Key Roles of the Lean Expert and Black Belt

1. Keep the Champion informed of project progress.
2. Develop, coach, and lead multi-functional improvement teams.
3. Mentor and advise management on prioritizing, charting, and launching projects.
4. Use and teach tools and methods to Green Belts, Yellow Belts, and Subject Matter Experts.
5. Actively seek to use the Lean Six Sigma Breakthrough steps to solve chronic problems, remove waste, and plan new services or products. Learn to align projects to local business objectives.
6. Provide project management, facilitate, and lead teams.

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To meet such responsibilities requires multiple skills, which include:

- A trained capability for leading people
- Familiarity with the subject matter of the goal
- A firm grasp of the breakthrough process and the associated tools

Green Belt

Green Belts are employees with sufficient knowledge to support and participate on Lean Six Sigma projects. They can be a team leader or a team member.

Key Roles of the Green Belt

1. May lead projects.
2. May be a core project team member.
3. Participate and contribute expertise to larger Black Belt projects.
4. Use Lean Six Sigma steps to solve problems.
5. Use Lean to remove waste.
6. Complete multiple projects over time, one at a time.

Green Belts are trained in the Green Belt toolset. Not all project team members need to be Green Belts, although some organization work to train enough staff to ensure that Green Belt certification is a minimum requirement necessary to work.

Yellow Belt/Team Member/Subject Matter Expert

A team will be composed of core team members, or Yellow Belts, who are process participants with a strong interest in the process you are improving. Core team members get involved in day-to-day work on the project.

In addition to core team members, Subject Matter Experts (SMEs) are identified to be called upon as resources from time-to-time because of their specialized knowledge.

Key Roles of the Yellow Belt/Team Member/Subject Matter Expert

1. Represent a department or function as a subject matter expert.
2. Review the charter from the Champion and understand the goal of the project.
3. Arrange to attend the team meetings.
4. Contribute job knowledge and expertise.
5. Propose theories of causes and ideas for solutions.
6. Constructively challenge the theories and ideas of other team members.
7. Volunteer for or accept assignments of homework.
8. Participate in tollgate reviews.

Yellow Belts/Team Members/Subject Matter Experts are trained in and use Lean Six Sigma methods and tools to solve business problems. They generally make up most of an improvement team.

Lean Concept: Lean Measurement/Metrics

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You begin the diagnostic journey by measuring symptoms. This helps to fully understand the nature and extent of the problem to be solved.

Definition: A symptom is the outward, observable evidence of a problem.

Example:

The following are examples of symptoms of quality problems:

- A blood sample drawn for a lab test clots and must be redrawn.
- A patient at high risk for falls gets out of bed unattended.
- A patient receives the wrong prescription.
- Essential instruments are missing on an operating room procedure tray.
- Patients are not seen until long after their scheduled appointment times.
- Transportation is delayed and a patient is late arriving for their scheduled procedure.

If symptoms like these occur on an ongoing basis, they signal chronic underlying quality problems.

To measure symptoms:

1. Develop operational definitions.
2. Measure the symptoms.
3. Concentrate on the vital few.

1. Develop Operational Definitions

Operational definitions act as an agreement on the meaning of key terms and measures stated in your business language. This removes ambiguity and assures everyone has a consistent understanding.

Often, definitions are needed to ensure that all project team members have the same understanding of the project charter.

It is important to spend time ensuring that team members agree on the definitions of key terms related to the project, because this helps to prevent false starts and often saves time later. All definitions should be documented in a team glossary, copied, and give to each team member. As new definitions are developed during the course of the project, these should be added to the glossary and distributed to the team. If you are in doubt about a definition, question other team members about their understanding. If you think others are in doubt, your asking for clarification may help them.

Operational Definitions

Notes:

Goal	Definition Required	Agreed-upon Definition	Additional Definitions Required
Reduce the number of late discharges	Late	After 11 A.M. or more than 2 hours after discharge order signed	When is the order considered signed?
Improve patient wait time for Diagnostic Imaging	Wait Time	Wait time >15 minutes from scheduled appointment time	
Reduce patient falls	Falls	To drop or come down freely, unassisted or under the influence of gravity	Falls with no injury Falls with injury Assisted fall

2. Measure the Symptoms

All quality problems have symptoms that can be objectively measured to determine the scope of a problem. Hunches and anecdotal information about symptoms can be useful, but they can also be misleading. Sometimes, symptom measurement already exists. At other times, your team will need to develop measurements before proceeding. If you need to develop a measure, asking these questions may be helpful:

- How do customers describe the symptoms?
- Where is each possible X observed?
- What documentation exists on the symptoms?
- What method should be used to obtain the measure?
    - Tabulations from databases
    - Data in administrative records
    - Interview
    - Physical counts of things: instruments, medications, documents, occurrences, etc.
    - Survey results
- What is the appropriate unit of measure?

- Time: year, months, weeks, days, hours, minutes
- Costs of poor quality: Dollars
- Errors: Number of errors as percentage of all occurrences

Example: Visiting the Doctor

Each time Betty visits the doctor she doesn't actually see the doctor until well beyond the appointed time. When she arrives, she gets a form from the receptionist to update her information. Shortly after she hands that in, a nurse escorts her back to the station where she is weighed and measured and vital signs are taken. Then she's put in an examination room where she waits for the doctor. She can wait at that point for up to 30 minutes.

Since they had heard this complain from patients before, the doctor's staff wanted to figure out how to measure and possibly shorten the time spent waiting to see the doctor.

- The symptom of the problem is the wait time. It is observed in the examination room. However, patients might be considering the time spent filling out the forms and having vitals recorded in addition to the examination room wait time. They decided that the appropriate unit of measure would be minutes, as they knew no one had ever waited hours.
- They needed to determine what method would be used to measure the symptom. Would they note the time when the patient was placed in the examination room, and have the doctor enter the time she entered the room on the patient's file? Or would they begin to measure from the time the patient checked in at the front desk until the time the doctor entered the examination room? How would the data be recorded and where?
- They decided that wait time would be defined as the time spent alone in the examination room waiting for the doctor.

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Lean Concept: Value Stream Mapping

Notes:

Lean focuses on finding value streams. A value stream consists of all of the activities within an organization which must be completed to generate a service or product. Any process involving a patient or customer is a value stream.

Understanding the value stream allows one to see value-added steps, non-value-added but needed steps, and non-value-added steps. Value-added activities transform or shape material or information into something that meets customer requirements.

Quality Tool: Value Stream Map

A Value Stream Map (VSM) is a particular style of a process map that shows all of the process steps required to complete a service or produce an output. It is a visual diagram of an entire process which allows you to see the whole picture – the information, products, and people that flow through a process. A Value Stream Map shows all of the tasks currently required to move a product or process from inputs (from suppliers) to outputs (to customers). Value Stream Mapping provides a common vocabulary to talk about improving patient care or process flow, and is a great tool to use in problem solving.

Key Concepts

1. Value Stream Mapping is a powerful tool for analyzing information and flow throughout or between organizations in order to identify and plan improvements.

2. VSM provides clarity to reduce inventory and lead time, as well as helps to plan and identify Lean rapid improvement events to increase effectiveness.

3. VSM allows participants from different parts of an organization to gain an understanding of overall information and material flow.

4. Making breakthrough improvements require out-of-the-box, cross-functional thinking. You must be able to see the waste across the entire flow of work to gain clarity to eliminate it.

5. VSM is a tool to help you visualize your Current State in order to realize the Future State.

The exercise of completing a Value Stream Map reveals waste, and sources of waste, that you probably wouldn't notice on a day-to-day basis.

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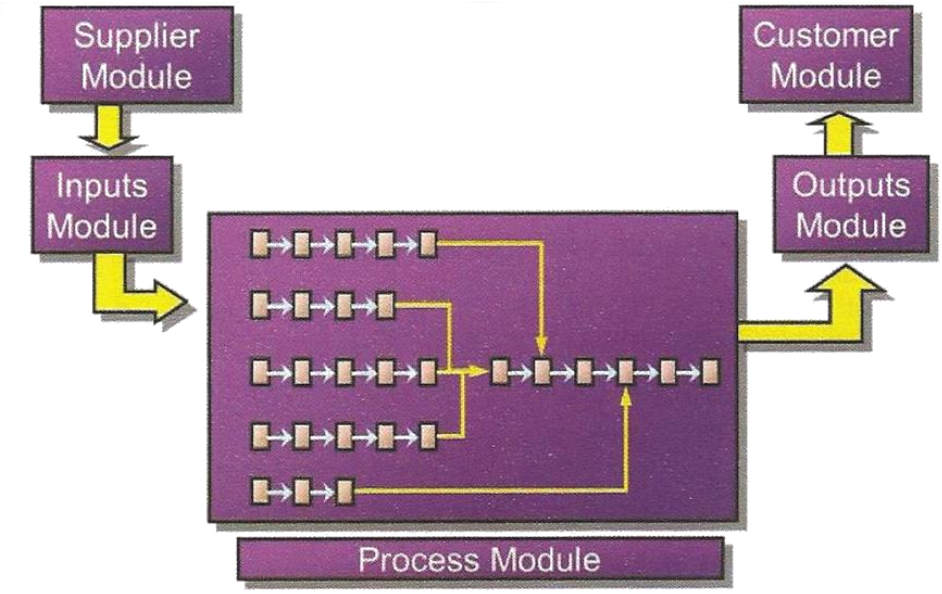
What Does a Value Stream Map Look Like?



Why is it called a Value Stream?

Value assumes that you are creating something worthwhile that a customer is willing to pay for, or something that contributes to the output of a process in a meaningful way.

Stream refers to a sequential flow of activities needed to deliver work units to a customer or to complete a process.

What Does a Value Stream Map Do?

A Value Stream Map creates a visual representation of the flow of an item through a process, and helps you see the source of waste. It provides a common language for describing processes while helping you avoid "cherry picking" Lean concepts and techniques. It becomes the blueprint for Lean implementation, and shows the linkage between information flow and the physical flow of the patient or item. Above all, it helps visualize the current and Future States.

What Information Does a Value Stream Map Show?

A Value Stream Map summarizes, on one page, a tremendous amount of information about a process.

Your map may include:

- The flow of the process from beginning to end
- Information flow
- Time data – cycle time, lead time, wait time
- Inventory build-up of people or things
- First time quality
- Staffing data

Notes:

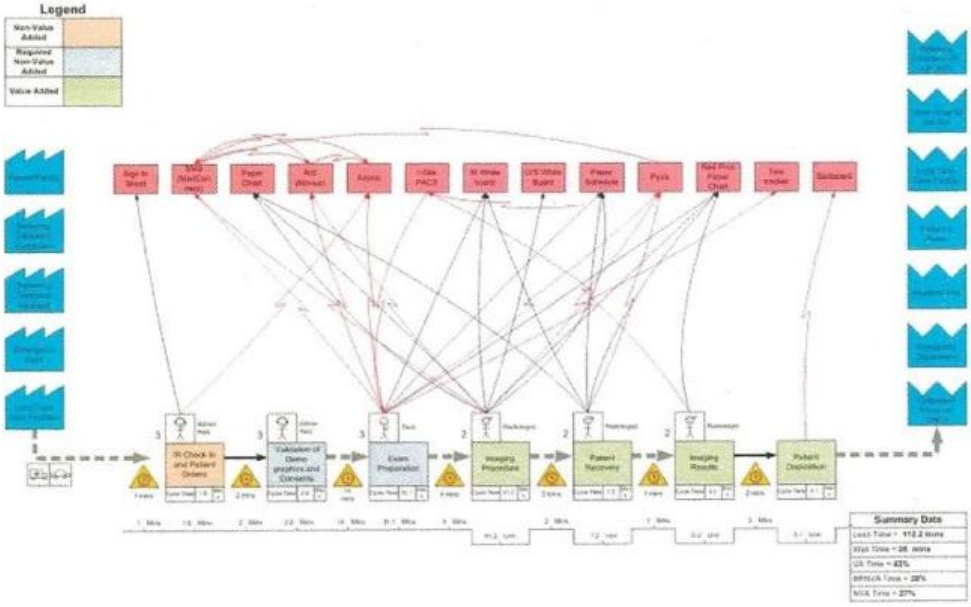
Value Stream Mapping in Healthcare

The **goal** of Value Stream Mapping in healthcare is to optimize the patient journey, or processes that support the patient journey.

The **focus** of mapping is to improve process that support caregivers and employees by distinguishing process steps which create value from those which don't (rework, wait times, etc.), and build in quality by eliminating waste.

The **results** are processes that create the most value for patients and customers but consume the fewest resources.

Example: Value Stream Map – Interventional Radiology Patients



How to Create a Value Stream Map

1. Select and schedule the VSM team to include:

    a. Subject matter experts who understand the process

    b. A Lean Expert to facilitate the mapping

    c. Fresh eyes to question the status quo and bring a new perspective

    d. The customer and suppliers, if possible, but at a minimum bring your VOC – CTQ data

2. Secure a room near the process area and gather the following supplies:

    a. Butcher paper

    b. Post-its

    c. Markers

    d. Pencils

e. Data collected in advance

3. Gather as much data as possible before you start. You will verify the accuracy of any pre-existing data in the VSM process. Look for information on:

a. Cycle time (C/T): The time it takes to complete all work elements before repeating them. Example: how long to triage a patient in the ED.

b. Value-added time (VAT): The time of work elements that actually transform the product (patient) in a way the customer is willing to pay for. For example: the time it takes to measure the patient's vital sign as part of triage.

c. Lead time (L/T): The time it takes once piece (patient) to move all the way through a process or a value stream from start to finish. Example: the time from patient arrival until the patient is discharged from the ED.

d. Work descriptions: Documented standard definition or explanations of job roles and responsibilities.

e. Number of workers: The total number of specific employees scheduled for a given shift or time block.

f. Total working time per day (all shifts): Total number of available hours to be worked/scheduled in a day. Some departments such as the OR may only operate 13 hours from 6am – 7 pm, whereas an ED will operate 24 hours.

g. Demand: Measure and stratify demand for products or services by type, time of day, and day of week. Example: the arrival pattern of ED patients by track, by time of day, by day of week.

h. Capacity: Estimate both schedules and theoretical capacity. Pay special attention to potential constrains and bottlenecks in the process.

i. Quantity of work performed: The total number of measurable work or units, performed for a given period of time. Example: total medication orders requested for each shift.

j. Waiting or delay time: Total time spent waiting for an activity to be performed due to bottle necks in the process or other causes of delay.

k. First pass yield: The percentage of time the customers need would be met the first time with no rework. Final yield is what a customer actually experiences, including rework.

Notes:

Notes:

4. Take a quick walk through the entire end-to-end value stream

    a. Instead of starting at the beginning of the process, start at the end of the process and walk upstream. This way you will start with the processes that are linked most directly to the customer.

5. Begin drawing the map with the VSM team.

    a. Start with the internal and external customer on the left and right hand sides of the page.

    b. Add the beginning and ending points of the process. Your process will begin on the left and end on the right side of the page.

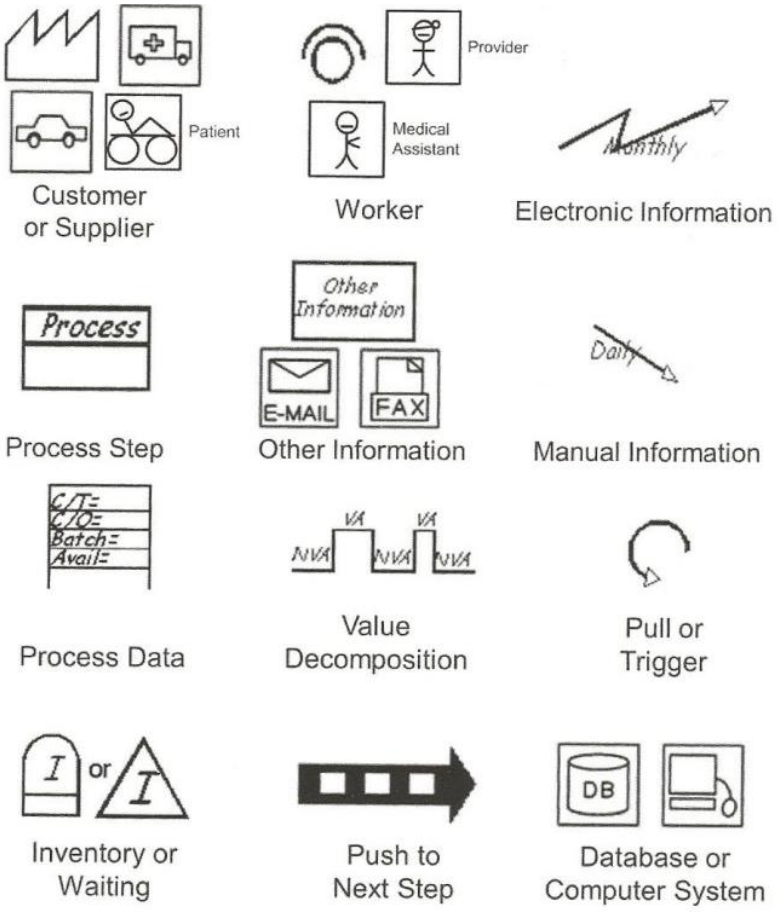
    c. Add process steps in between, remembering to focus on how things really are, not how they should be.

    d. Document the flow of information. Usually this is done with red zigzag lines.

    e. Add push-pull arrows showing the patient moving from step to step

    f. Add a data box below each process step.

Common Symbols Used in a Value Stream Map



- **Customer or Supplier:** In healthcare it is very common for patients and providers to be included as both the customers and suppliers in the value stream.
- **Worker:** Some icons use stick figures while others can be a view from top down; imagine that you are looking at the top of the workers head from the ceiling down.
- **Electronic and Manual Information:** Remember that the value stream should also depict information flow. You will typically label the different IS systems and vendors using a rectangular box at the top of the map.
- **Process Step:** A general rule of thumb is that a process box indicates a process in which the item (patient) is flowing. Drawing one box for every single processing step would make the map unwieldy.
- **Other Information:** Information is passed in many different forms such as verbal communication through phones or electronic communication devices, text messages, email or fax. All of these modes can be represented by a unique symbol.
- **Data Boxes:** These are placed under the supplier and customer icons to document requirements. Data boxes are placed under the process box to record relevant process metrics.
- **Value Decomposition Timeline:** This allows you to compare the value added times or the processing times to total lead times.
- **Pull or Trigger:** This is a process box or resource that, when available, triggers a signal to upstream processes to produce in order to feed the available capacity. For example, a scheduled discharge is a trigger which signals the ED that a bed will soon be available for a new admission.
- **Inventory or waiting:** In healthcare, people are often inventoried, so that providers or expensive capital assets are fully utilized.
- **Push vs. Pull Arrows:** Push production is signified by a striped arrow. Pull production is signified by a solid arrow.
- **Database:** This may be either manual (paper) or electronic and symbolizes where information is stored in the process.

6. Validate the Map. Go to the actual process area, observe the process, talk to staff, and then update your map with what you have learned.

a. In the team room, complete as much of the map as possible.
b. Take the team to the actual process area.
c. Observe the process and talk to employees.
d. Note any discrepancies between what the team documented and what was actually observed or described by employees.
e. Use a stopwatch to manually collect time data if needed.
f. Return to the team room, discuss observations, and update the map.

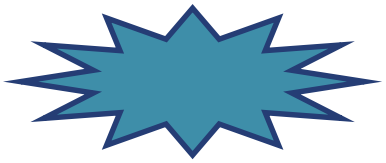
Notes:

Notes:

Kaizen Bursts

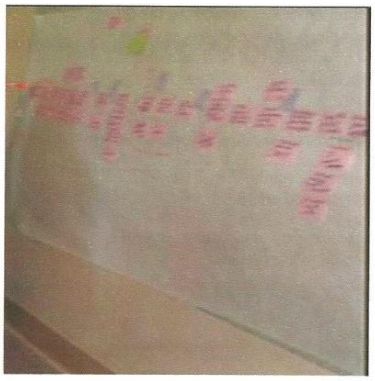
At this point in the development of the Value Stream Map, it is an ideal time to identify known issues within the process and visually document them with what are called Kaizen bursts. Make sure the bursts stand out and draw attention to where issues exist. If using post-its, bright florescent colors work, or if using an electronic program, highlight the bursts in bright yellow.

Example: Kaizen Bursts

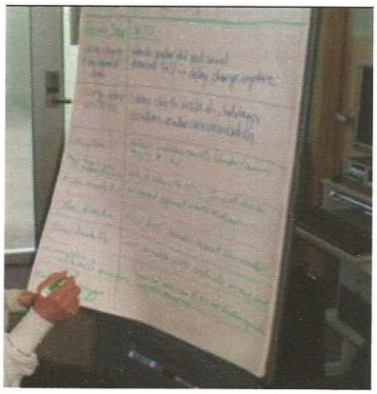


Tips for Creating a Value Stream Map

- Even if you plan on putting your map in a software program such as eVSM, iGrafx or Visio, start off with low-tech tools such as butcher paper and post-its.
- Move, eliminate, or add post-its as the team learns about the process.
- This method allows for greater team interaction.



- As you are mapping, don't get hung up on discussion solution or what must be fixed in the process. You will get to this after you do the analysis on your Current State Map. However, you don't want to forget good ideas that come up, so nominate someone to document the ideas, and move on with the mapping.



Notes:

Pitfalls of Value Stream Mapping

One common pitfall in Value Stream Mapping is to forget that you are following the "thing moving through the process," not staff members. Whether the thing is a patient, a medication, or an invoice, always document from the perspective of that thing. Remember, the Value Stream Map is not the same as a process map.

Stay Focused on the Thing Moving Through the Process

Notes:

Lean Concept: Rapid Improvement Events

Rapid Improvement Events (RIEs) are conducted to enable project reams to analyze the current problems (topics) quickly and develop/implement solutions in a short time-frame. The teams are cross-functional so that all aspects of the problem are considered and solutions will be understood and accepted by all.

Key Concepts

These events require:

- Focus on one topic for multiple days (typically four to five days depending on the type of RIE)
- Short-term multi-functional teams
- Use of the RIE methodology

This technique requires an organizational culture that empowers employees to identify and solve problems. It uses established methods that are reinforced through training.

Tools Used in a Rapid Improvement Event

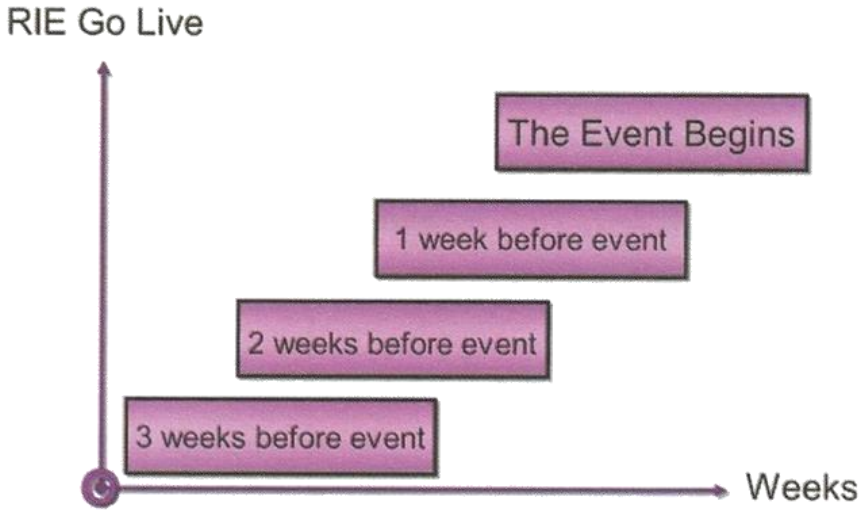
1. 6S implementation to organize the value streams selected for optimization
2. VOC Analysis to understand customer needs and value
3. SIPOC to understand process inputs, outputs, suppliers, customers
4. Value Stream Maps created to analyze processes for non-value added tasks during processes
5. Spaghetti maps used to streamline and reduce travel time
6. Cycle time and Takt time calculations for demand and labor requirements during processes
7. Workflow analysis to identify waste in the process and devise ways to eliminate it
8. Standard Worksheets to understand the Current State and define the Future State
9. Lead charts to level the workload throughout the process
10. SMED or quick changeover techniques are utilized to optimize uptime
11. Failure Modes and Effects Analysis (FMEA) conducted on flow
12. Mistake Proofing techniques for error reduction opportunities

Notes:

Key Activities to Complete Before an RIE is Started

1. Determine the target business process value stream.
2. Create the team.
3. Develop team charter.
4. Determine key metrics and targets for the team.
5. Ensure the team is ready to get to work.
6. Make sure the team is communicating, communicating, communicating.
7. Review the "RIE Recommendations" document.
8. Finalize boundaries of the team (or clarify as necessary).
9. Confirm details (resources, logistics, food, timekeeping as necessary for the team members, supplies, schedule commitments, etc.).
10. Train team members.
11. Complete Current State Value Stream Mapping.

The RIE Schedule



Three Weeks Before Event

1. Determine the target business process value stream
2. Create the team
3. Develop the team charter
4. Determine key metrics and targets for the team
5. VOC Analysis
6. SIPOC
7. Begin Current State Value Stream Map

8. Review “RIE Recommendations” document

The target value stream is the process that the team will focus its improvement effort on.

Remember that the ideal team should include five to six members from different functions who understand the process being targeted.

The key metrics are those measures that indicated success or failure of the process. They can be output or time-related, or be any metric that indicates the process is performing well.

Two Weeks Before Event

1. Gather as much data as possible
    a. Customer demand – actual not forecast
    b. Output from the process
    c. Hours worked directly on creating output
    d. Other hours worked within the process
    e. Productivity measures based on output and hours
    f. Catalog problems, customer issues, staff issues, errors, wasted supplies, rework, etc.
2. Continue developing Current State Value Stream Map
3. Ensure team is “ready to rumble”

One Week Before Event

1. Finalize boundaries and team.
2. Train team members!
3. Communicate, communicate, communicate.
4. Confirm details (resources, logistics, food, timekeeping for team members as necessary, supplies, schedule commitments, equipment availability, etc.).
5. Complete Current State Value Stream Map.

Team boundaries refer to what is in scope for the Rapid Improvement Team. It may also be helpful to indicate what elements are out of scope for the team.

Notes:

Notes:

The RIE Schedule

Day 1

1. Validate business process Value Stream Maps. Understand the "before" values.
2. Study current conditions.
3. Complete the following:
    a. Workflow Analysis (VA/NVA decomposition)
    b. Current State load charts
    c. Current State spaghetti diagrams
    d. Current State standard worksheets
4. Review Day 1 and plan Day 2.

Day 2

1. Review results of Day 1.
2. Review Current State analysis.
3. Design the Future State.
4. Design control sheets.
5. Communicate, communicate, communicate!
6. Develop Future State standard work.
7. Develop open issues ("To Do") list.
8. Plan for Day 3.

Notes:

Day 3

1. Review Day 2 activities.
2. Implement changes!
3. Create control sheets.
4. Review standard work, “To Do” lists, etc.
5. Plan for Day 4.

Day 4

1. Review Day 3 activities.
2. Analyze results on control sheets.
3. Make optimized business process successful.
4. Team helps and assists.
5. Plan for Day 5.

Day 5

1. Review Day 4 results and confirm any homework assignments.
2. Finalize flow, procedures, standard work, and control sheets.
3. Document achievements, “To Do” list, and lessons learned.
4. Prepare presentation.
5. Present results to management and celebrate!

First Week After Event

1. Ensure the completion of documentation for standard work.
2. Ensure production control board, SWIP, 6S, etc., are in place.
3. Eliminate any problems each day.
4. Schedule walkthroughs multiple times each day with the cell manager, value stream manager, etc.
5. Work on the “To Do” list.
6. DO NOT BACK OFF!

Second Week After Event

1. Confirm that standard work is posted.
2. Continue reviews with the process owner/value steam manager.
3. Continue to eliminate problems and improve work flow.
4. Work on the “To Do” list.
5. Sustain – DO NOT BACK OFF!

Three Weeks After Event (Ongoing)

1. Develop an audit process and audit schedule for on-going sustainability.
2. Action items after each audit are to be assigned and completed within a specified time.
3. Schedule reviews with management at defined frequencies and ensure controls are in place to sustain improvements.

Notes:

Lean Concept: 6S (Sometime referred to as 5S)

Notes:

These six actions are part of a technique that was developed by the Japanese to remove clutter from the work area, organize the workplace, prevent defects from happening, and improve work flow.

1. It is one of the basic elements of Lean that an organization can implement. It is a great improvement tool that is very easy to use and brings "order out of chaos."

2. This technique should be put in place prior to other project solutions being implemented because it can yield additional results on its own merits. Also, the final solution implementation will be easier to put in place if this technique is done first.

Knowing the six S's as well as the individual steps within each S, you will now delve a little deeper to learn how to deploy 6S in your workplace and also learn how to maintain the efforts in the months to follow.

Why Implement 6S?

6S will reduce complaints, errors, clutter and wait times which will increase customer satisfaction, loyalty and patient safety. Quality outcomes will improve in addition to gaining better flow and staff productivity. Access to the right supplies, at the right time, at the right location will increase staff satisfaction. Additionally, the patient experience is enhanced.

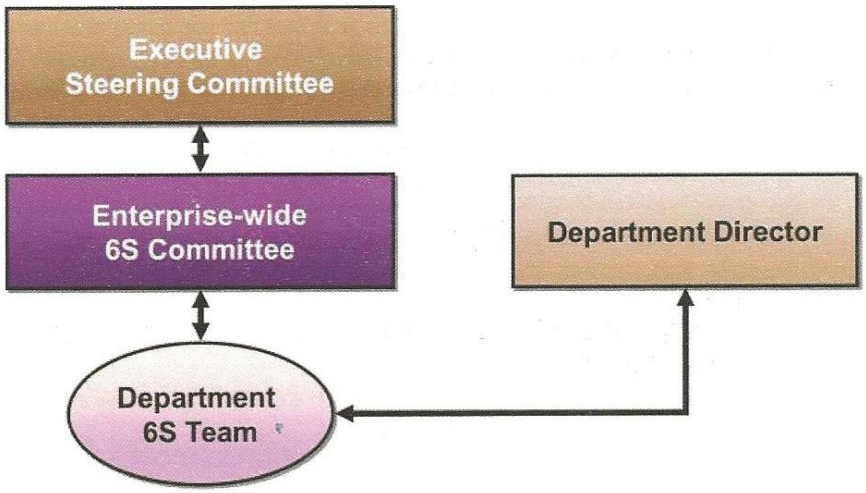
How to Implement 6S

Step 1: Organize for 6S

Get everyone from the top management to front-line employees to participate.

Your Executive Steering team will appoint someone as the 6S Champion. Much of his or her time will be devoted to the 6S program and chairing the Enterprise-wide 6S Committee.

Get Everyone to Participate



Notes:

Executive Leadership

The Executive Team consists of the business leaders, the CEO, and direct reports, they will work with the Unit Director to create the 6S team.

Leadership will establish a Steering Committee to:

1. Select the best opportunities to improve business performace using the 6S methodology
2. Define departmental 6S goals and establish accountability for meeting those goals
3. Provide the necessary training and resources
4. Monitor team progress and remove obstacles and barriers
5. Determine audit frequency and monitor outcomes
6. Develop reward and recognition strategies

Policy

1. Management will lead by example.
2. Work standards for Enterprise-wide implementation will be determined.
3. Each work area's individual opinion and differences will be respected.
4. A phased implementation strategy with continuous improvement involving everyone will be employed.

Role of Enterprise-wide 6S Committee

This committee has primary responsidility for the oversight of 6S activities.

If a hospital-wide performace improvement committee already exists, it is not necessary to develop a 6S committee separately. The committee should incorporate 6S initiatives into their charter. The committee should:

1. Be chaired by the 6S Champion, appointed by Executive Leadership
2. Provide oversight to all 6S initiatives
3. Maintain standardization of 6S audit boards and tools
4. Make recommendations to the Executive Steering Committee on areas suitable for 6S implementation
5. Ensure compliance to 6S audit process and monitor results
6. Report 6S metrics to the Executive Steering Committee

Role of Department Directors

This group has primary responsibility for creating the 6S team and for implementation within their areas. The Department Director:

1. Sets expectation for 6S
2. Creates 6S team and training schedule
3. Participates in 6S activities
4. Provides staff with 5 – 15 minutes a day for 6S
5. Maintains visual documentation on 6S Action Board
6. Monitors 6S results and action items to improve performance

Department 6S Team

The 6S team consists of staff who are touched by the 6S process. Each department will create a 6S team. Team members are expected to:

1. Attend all training sessions
2. Implement S1 – S6 on their unit
3. Maintain the 6S board
4. Complete 6S audits according to a set schedule
5. Post results and identify improvement actions

Role of the Staff

Employees play a part in carrying out 6S activities. The employees should:

1. Be open to learn about 6S
2. Help educate other employees
3. Be cooperative and enthusiastic
4. Be proactive and take initiative to implement 6S
5. Partiipate in 6S audits
6. Be disciplined

Step 2: Implement S1 – S3

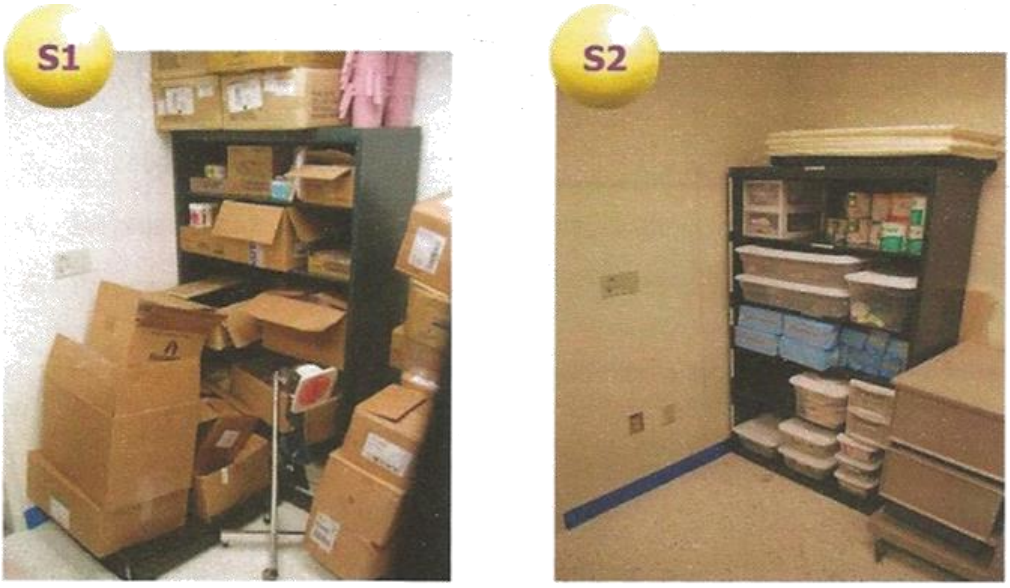
1. Train team on S1 – S3; devote 2 to 3 hours of training for each group.
2. Make practical exercises part of the training.
3. Prioritize the areas of improvement.
4. Go IMPLEMENT!

Notes:

Notes:

Example Implementation

Boxes and items were strewn about everywhere with absolutely no organization. The cardboard was removed, and supplies were sorted and stored in plastic bins.



Visual Cues

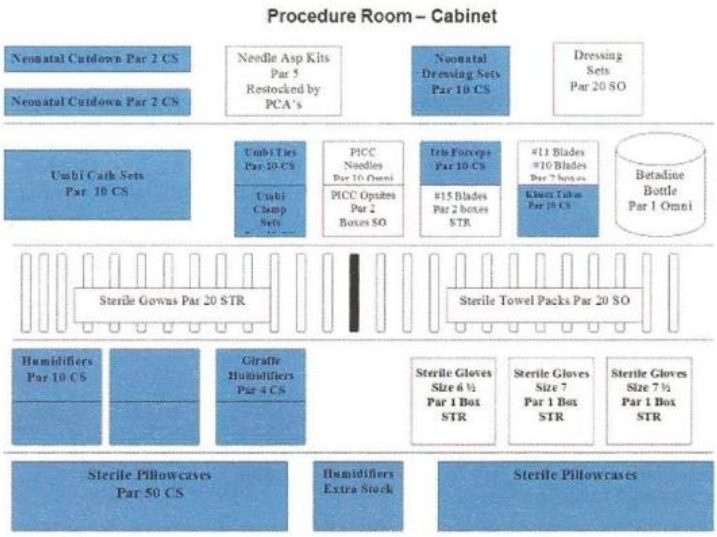
Remember the saying "A picture is worth a thousand words?" Visual Management and Visual Controls are based on that philosophy.

Visual Management incorporates visual controls and process layouts so that spotting an abnormal or unsusal situation is easy.

Visual Controls may be used to show:

- How to do a job
- Where things are stored
- How to use a tool or device
- Required inventory levels
- Performance measures
- When help is needed
- Potential hazards

Example: Visual Cues



Above is an example of a storage cabinet in a NICU

Step 3: Implement S4 – S6

Implement S4 – S6 after S1 – S3 has stabilized.

1. Train the team on S4 – S6; devote 2-3 hours of training for each group.
2. S4 – S6 usually takes place a few weeks after S1 – S3 is complete to allow each area time to implement the first three S's.
3. Make practical exercises part of the training.
4. Complete standard work.
5. Complete 6S audits.
6. Create 6S Action Board.
7. Post audit results on 6S Action Board.

Potential Roadblocks to 6S Implementation

- Management does not provide resources or time to complete.
- Directors and staff do not buy into 6S. They believe that current cluttered departments are fine.
- Audits are not completed and reported as scheduled (key sustaining metrics are not in place).
- Action lists are not developed or implemented.
- Staff is resistant to new changes.

Notes:

6S Conformance Audit

The 6S Conformance Audit is one of the most important tools for maintaining a 6S program. Audit frequently in the beginning and less frequently as your scores rise and stay consistently high.

Key Concepts

1. The audit tool is easy to use and relatively quick to conduct.
2. It provides a basis from which to first understand the current condition of the area, and further gauge the level of improvement over time.
3. The Spider diagram visual results are quick and easy to read. Posting in a visible location provides motivation and knowledge to all staff of the current performance in the area.

What Does the Audit Tool Look Like?

The audit tool consists of three parts; a criteria table to assist in the scoring, the scoring or the audit, and the results which are presented in the form of a spider diagram.

The following table is a sample of the scoring criteria. Use it as a guideline when conducting the audit.

Audit Cirteria

SCORE	SORT	SET IN ORDER	SWEEP & SHINE	STANDARDIZE	SELF-DISCIPLINE	SAFETY
1	Needed and unneeded items are mixed together at the workplace	It is impossible to tell what goes where and in what amount.	The workplace is left dirty.	Schedules for area cleaning and organizing are not in place. Any cleaning is done when it really needs it.	Few employees understand the idea of 6S. A little training has occurred but no action plans are in place.	Safety is not of prime importance. No one person or organization "owns" safety. Safety issues never seem to be corrected.
2	It is possible (but not easy) to distinguish needed/unneeded items.	It is possible (but not easy) to tell what goes where and in what amount.	The workplace is cleaned once in a while.	Schedules for cleaning do exist but are not followed.	Everyone has been introduced to the basics of 6S. A team has been selected to lead the improvements.	Fundamental safety training has occurred as required by law. Most safety related resources are available but conditions vary between departments.
3	Anyone can easily distinguish needed/unneeded items.	There are location and item indicators for all tools and gages, as well as supplies and material.	The workplace is cleaned daily.	A cleaning schedule is sometimes followed, especially for visits from an outside facility.	The first three components of 6S are in place throughout the facility. Benefits are starting to be captured.	Safety discussions occur weekly. Specific safety measures are tracked and posted. Safety issues are routinely addressed.
4	All unneeded items are stored away from the workplace.	Various techniques (i.e. color coding, outlining, easy replacement methods) are used to facilitate replacing things properly.	Cleanliness has been combined with inspection.	Cleaning schedules are followed daily involving everyone in the area.	6S audits are performed regularly throughout the workplace. The audit results are posted in the area.	Ownership is given to specific individuals to facilitate safety. Training is held regularly and throughout the facility focusing on behaviors.
5	All unneeded items have been disposed of.	Tools and gages are unified and, when possible, eliminated. Specific indicators show what supplies and materials go where and in what amount.	Cleanliness (dirt-prevention) techniques have been implemented.	Audits are regularly performed. Scoring and action plans are posted and used as a driver for change.	Audits drive improvements. Accountability is understood. Actions are completed quickly with little planning require.	An audit process is firmly in place. Safety discussions occur daily. Safety issues are quickly corrected.
6	Only needed items are present and visually controlled.	There is a place for everything and everything is in its place.	The workplace stays clean based on visual controls and manufacturing disciplines.	The actions between Sort, Set-In-Order and Sweep are smooth and seamless. Little effort is required to "run" 6S.	The culture has changed. 6S is part of how we work.	Everyone is actively engaged in safety. Audits occur continuously with immediate corrective actions.

Lean Concept: Mistake Proofing

Notes:

When a team mistake proofs its solution, it makes it so reliable that the likelihood of mistakes or failure is minimal. Here are a few tactics that can help to mistake proof a solution:

1. Design systems to reduce the likelihood of error.
2. Replace human sensing with technological sensing.
3. Keep feedback loops as short as possible.
4. Use active, rather than passive, checking.

1. Design Systems to Reduce the Likelihood of Error

Often it is possible to design work so that errors are either impossible or very unlikely.

Example

- Make it impossible to attach the vacuum line to an oxygen outlet by installing different sizes or shapes for vacuum and oxygen connectors.
- Comply with the Surgical Safety Checklist before induction of anesthesia, before skin incision, and before patient leaves the room.
- Follow "red rules" established by organization or department; i.e. positive patient identification.
- Decrease the likelihood that a needed item is left off the surgery cart by prepackaging kits of instruments and other surgical items.

2. Technological Sensing

Usually, technology can provide better measures than human senses.

Examples

- A thermometer is a better gauge of temperature than a hand held to the forehead.
- An echocardiogram measures heart function more reliably than a stethoscope.
- A date-time stamp is more reliable than human transcription.
- The laser reading of bar codes is more accurate than manual data entry by keyboard or paper and pencil.
- The reading and input of insurance numbers by optical or magnetic scanning is more error-free than manual entry.
- Using the computer to edit and cross-check entries is more dependable than proofreading.

3. Keep Feedback Loops as Short as Possible

There are two ways to keep a feedback loop short. First, if checking is required, examine each piece of work soon after it is completed. This can prevent repetition of an error.

Notes:

Examples

- Many healthcare organization use concurrent chart review, usually on a daily basis, to help ensure the quality and effectiveness of care.
- Computer entries are best edited as they are made, not later, in "batch-runs."

The second way for a feedback loop to be short is to report the results of checking directly to the individual doing the work. The longer the delay in reporting, the more likely it is that the feedback will be ineffective, and new errors will be made. Providing individuals with the means and the authority to check their own work is the ideal way to keep feedback loops short.

Examples

- Posting current wait times in a clinic to provide direct and immediate feedback
- Reporting abnormal vital signs to the Primary Nurse to provide immediate intervention

4. Active vs. Passive Checking

Actively doing something to check a result is far more accurate than merely inspecting it. Human inspection can be easily fooled and becomes more error-prone with fatigue.

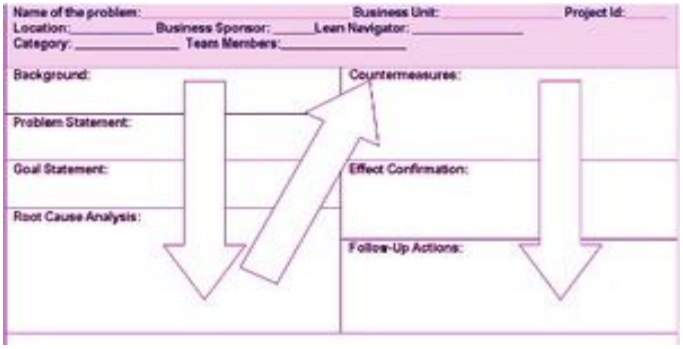
Example: Active vs. Passive

> With blood donation, it is critical that the identifying number on the blood bag match the number on the sample tube that goes to the lab for testing and typing. A single person assigned to compare the two numbers might miss as much as 20 percent of the errors. This is passive checking, and it is highly unreliable.
>
> If two individuals are assigned to compare the identifying numbers, one can check the bag while the other reads the tube. The first person is active, and the checkers might still miss a small percent of the errors.
>
> A third method would also use two checkers. With this method though, each checker would independently key the number for each donor into a small computer terminal that compares the number on the bag with the number on the tube, and the error rate would be so small it might even be impossible to measure.

Lean Concept: A3 Problem Solving

Notes:

The A3 report is so named because it is written on an A3 sized paper (metric equivalent of 11" x 17"). The concept has been adapted for use by health care workers, most of whom do not have engineering or business backgrounds. The report flows from top to bottom on the left-hand side, then top to bottom on the right-hand side. A three-hole punch on the left-hand combined with a tri-fold enables A3 reports to be stored in standard three-ring binders. While the names of the boxes can change, the basic storyline of the report remains the same.



Theme & Background

Every report starts with a "theme" or title. The theme indicates the problem being addressed, and is fairly descriptive. The theme should focus on the problem, and not advocate a particular solution (e.g., "Interruptions to Pharmacists work resulting in long turn-around times," not, "Hospital units calling instead of faxing inquiries to Pharmacy").

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

Current Condition

This section is perhaps the most important section in the A3 report. The author draws a diagram that depicts how the system that produced the problem currently works. Problems are highlighted on the diagram with storm bursts. Also, the author should quantify the extent of the problem (e.g., percent defects, hours of downtime, etc.), and display this information graphically or numerically somewhere in the current condition. The diagrams should be neatly drawn, and readily understandable to any knowledgeable reader. Helpful toward this end is a set of standard icons for different entities.

Notes:

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

The purposes of diagramming and quantifying the problem are several. First, the act of drawing a diagram enables deeper understanding by helping the author organize knowledge and learning gained from observation compactly.

Second, the diagram quickly and effectively communicates the core issues to others. The graphical medium can contain a very dense amount of information, and yet readers can pick it up quickly because of the pictorial representation. Thirdly, by diagramming the system, problem-solving efforts are focused on the system rather than the people. It results in a more objective approach with less defensive posturing and finger-pointing.

Root Cause Analysis

As the author comes to understand the current condition in a deep and meaningful way, it becomes imperative that s/he comes to understand the root cause of the problem symptoms shown as storm bursts in the current condition diagram. Failing to address the deeply rooted seed of the problem means it will likely recur. A common technique for root cause analysis is the "5 Why's" method. The problem-solver simply asks a why question approximately five times in series. Experience has shown that stopping at two or three why's usually means that the inquiry has not gone deep enough. One possible guide is whether the inquiry touches on at least one of three basic principles for design of organizational systems:

1) Are work activities sufficiently specified according to content, sequence, timing, and outcome?

2) Are connections between entities clear, direct, and immediately comprehended?

3) Are the pathways along which goods/services travel simple, direct, and uninterrupted; are all the steps value-added?

Notes:

Target Condition

Now that the problem-solver has a keen understanding of how the work currently gets done, and has a good grasp of the root cause(s) of the problems experienced with the system, s/he is now ready to consider how the system might be improved. The A3 process calls the improvements countermeasures (rather than the ubiquitous "solutions") because it implies that a) we are countering a specific problem, and b) it is what we will use now until we discover an even better countermeasure. The countermeasures address the root cause(s) while conforming to the three design principles. The goal is to move the organization closer to an ideal state of providing exactly what the customer (patient) needs, safely, when needed, in precisely the right quantity, and without waste.

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

Implementation Plan

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

Follow-up Plan

How will the organization know that the new system is actually better than the old? The follow-up plan indicates how and when the author (or other designate) will measure the improvement of the system or the results of a specific test. It should include a realistic and quantified prediction of how the new system will perform (e.g., X% decrease in defects, or turnaround time reduced to Y minutes). The prediction should be as accurate as possible, based upon the author's deep understanding of the work and the countermeasures planned. It should not be a shot in the dark, or an unrealistically ideal case. For example, while ideally we would like to see zero defects, will the countermeasures envisioned realistically achieve zero defects? If not, how many defects can we expect with the new system?

Results Report

The follow-up results reporting step is absolutely critical to maximizing learning within the organization. The current condition and root cause constitute the necessary background research, the target condition and implementation plan outline the experimental design, and the follow-up plan states the hypothesis. So the results reporting section is critically important for evaluating whether the hypothesis is supported.