Module 10: Lean Improvement Tools
So where are we in solving the problem and improving the process?

• Your Charter articulated the problem and its importance, and the project’s objective and its stakeholders

• SIPOC, Process Mapping and (Value) Analysis, and Root Cause Analysis described how things work today, the pain points of waste, variation and problems, and the causes of those issues

• Now we move to minimize the effect of or eliminate those root causes via improvement actions
The Improve & Implement Phase

1. Define
2. Measure
3. Analyze
4. Improve & Implement
5. Control

Structured (DMAIC) Improvement Process Framework

Establish Organizational Goals
Benchmark Performance
Identify Improvement Opportunities
Charter Projects

Organization Wide Planning Framework
Module 10: Objectives

• Learn about transition from the Current State to the future “Ideal State” of the problematic process
• Understand the importance of using countermeasures to enable the Ideal State
• Review the typical types of waste in healthcare, examples, root causes, and possible countermeasure
• Learn improvement tools to use as countermeasures: Standard Work, Visual Management, Error-Proofing, and 5S
Recall the Definitions & Purpose of Lean

Waste refers to **barriers that prevent continuous flow** of people, information and materials so that patients, customers and/or staff have what they need when they need it without stops or interruptions.
Recall Definitions & Purpose of Lean

- Lean is about making the right work easier to do by eliminating waste, thereby freeing up capacity, increasing quality and delivering greater value to the patient or customer.
- But what is the “right work”, and how do we assess our current process’ strengths and weaknesses in redesigning it to achieve the right work?
- Answering the following types of questions help you assess your process and provide ideas for redesigning the work.
How “Right” is the Work in Your Process?

- Is it clear what activities should occur, in what sequence, and in what approximate amount of time?
- Is every step in the current process adding value to the patient/customer - does it move the process forward?
- Is the participation of every person who touches the process necessary?
- Does everyone who performs the process do so in the same way?
- How does a new worker/or you learn the process?
- Approximately how long should the process take to complete?
- Is the expected outcome clearly understood?
From the Current to the Future State

• Now that we have assessed our current, wasteful and problematic “As Is” process, we move to the Future State or “To Be” process; but before we can do that, we must have completed the following and have it validated with data, observation and engagement of stakeholders
  ✓ Clear understanding of the problem – scope, process steps, stakeholders
  ✓ Knowledge of all the pain points of waste, variation, and issues, and their root causes
Creating the Future State - the Ideal State

We want to go beyond providing solutions to problems, we want to design the work to create a new and better reality, striving for an **Ideal State** - what could that look like?

- Exactly what the patient/customer needs, error free with the desired outcomes
- No Waste – without the workarounds and rework of the Current State Process
- On Demand, exactly as requested, customized to each individual patient/customer – standardized processes that support flexibility to meet specific, individual needs
- Immediate responses to problems or changes
- Safe for patients/customers, staff, and clinicians: physically, emotionally & professionally
Creating the Future State - the Ideal State

**Process:** Mammogram Scheduling

**Current State:** 4 rework loops that cause ▶10-60 min delay/cancellation because patient doesn’t have MD order
▶ Numerous phone calls (rework) to Physician offices by hospital staff to obtain MD order
▶ Inconsistent/unpredictable Radiology schedule

**Ideal State:**
▶ Clear letter to patient - they know what to expect and what to do
▶ No rework loops - mammogram letter to patient acts as MD order, process flows for the patient, Physician office, and hospital staff
▶ Minimal/no delays in service - patient only has to schedule appt, arrive, register and have mammogram performed – no calls to MD for order
▶ Consistent, predictable Radiology schedule
Ideal State and Countermeasures

• The Ideal State is not likely achievable in one attempt or 100% of the time, it is a vision to strive for

• Countermeasures are the improvement actions that will move the process closer to the Ideal State or make the process more efficient by addressing root causes. Using the term countermeasures implies that
  ➢ We are countering a specific problem
  ➢ It is what we will use now until we discover an even better countermeasure, remember
    • The learning and improvement is continuous - don’t let the eventual/hopeful “best” prevent the “better” now
    • Better to have a good system that you can implement, than the perfect one that you can’t
  • Refer to the “7 Mudas of Healthcare” handout
Exercise #10: Determining Countermeasures

• Refer to your List of Issues and Root Causes
• For each issue for which you have identified the root cause
  • Determine the countermeasure that will reduce/eliminate the root cause of the issue/waste/variation; you can use the 7 Mudas of Healthcare handout as a guide
  • Do your countermeasures bring your process closer to the Ideal State? Ensure that your defined countermeasures do not inadvertently create other problems
• Document the countermeasure in the Improvement Actions column
• Document how you will confirm the efficacy of the countermeasure - will you perform a small test of change/run a pilot study/collect and analyze data?
• If easy to determine/already known, document who will implement each countermeasure and by what date
Exercise #11: Creating your Ideal State

• Review your Current State/“As Is” process map and all the pain points and root causes therein
  • What steps could you eliminate or combine? What workarounds/rework can you eliminate/minimize?
  • If you can’t eliminate/combine steps, are there steps that can be done in parallel vs. in series?
  • Are connections between people or departments simple and direct?
  • Are there clear triggers for an activity/process step to start?
  • How would you know the process step was completed successfully?

• Based on the above, build your Ideal State process map using pink/purple stickies

• Use green stickies to note positive features of your proposal
Improvement Tools for Countermeasures

- There are a variety of Lean Improvement Tools, many of them overlap
Standard Work

Primary lean tool for determining who, what, when, where and how work is to be performed to consistently and reliably deliver the best possible results to meet patient/customer needs.
What does good Standard Work look like?

All the activities of work in a process are clearly specified by

- **Content** – what the work is and what resources it requires (think inputs/6M’s: info, materials, equipment, staff, training etc.)
- **Sequence** – the order in which activities should occur
- **Timing** – about how long it should take to complete the activity, which should be balanced with demand to ensure flow
- **Outcome** – what result is clearly expected (think outputs e.g. completed document with info on xyz)
Benefits of Standard Work

For Patients/Customers

✓ Can rely on our levels of quality, cost and delivery
✓ Receive higher level of value

For Processes

✓ Processes are stable and predictable, repeatable regardless of who performs it, which facilitates operating flexibility - as demand fluctuates, Standard Work can be quickly reallocated among the staff with little disruption

✓ Preserves know-how and expertise, promotes organizational learning, provides basis for employee training

✓ Easier to detect when there is a deviation from what’s expected, ensuring compliance

✓ Sets foundation for further waste reduction and continuous improvement
Important Points about Standard Work

• Specifying or standardizing the work is not intended to replace/interfere with professional judgment - instead, it should develop confidence and reliability in processes that support effective work.

• Standard Work should be written by the people who do the work and reviewed by the supervisor.
  • They know the work best and are in a better position to document it effectively and accurately.
  • More likely to accept Standard Work if they were integral in providing input in its creation.
Good Standard Work

• Depicted so people can understand the process - simple, perhaps totally pictorial so that they could be followed by someone who speaks a different language.

• Specific in content, sequence, timing, and outcomes of activities – precise as to what actions to take, how, when and where to take them, making it clear where people’s responsibilities lie without contradiction or unrealistic instructions.

• Should describe how to prevent variation by explaining underlying cause-and-effect relationships.

• Practical and easily accessible from where the work is done.
What does Standard Work look like?

• Standard Work can come in many forms
  • Process Maps
  • Templates
  • Worksheets
  • Check Sheets
  • Standard Operating Procedures - more lengthy and detailed written documents
Standard Work - Process Maps

• Process maps are a key type of documentation used in Standard Work

• Your Future State/“To Be” map is a good introduction to your new process, but will likely require another level of detail so that it can become a more instructive document

Start
Pt receives letter, contacts PAS
PAS schedules appt with Pt
Pt arrives for appt
Pt registers
Radiology performs Mammogram
End
Standard Work - Templates

Templates are an excellent start to establish a standardized process
## Standard Work - Worksheet

<table>
<thead>
<tr>
<th>Step</th>
<th>Major Step</th>
<th>Key Point /Special Instruction</th>
<th>Analysis Diagram</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Walk to location A</td>
<td><strong>Pick up part instrument</strong>&lt;br&gt;A. Check for autoclave stamp&lt;br&gt;B. Be careful of sharp edges&lt;br&gt;C. Remove wrapping&lt;br&gt;D. Inspect</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Walk to location B</td>
<td><strong>Lay instrument at location B</strong>&lt;br&gt;A. Pick up&lt;br&gt;B. Check for autoclave stamp&lt;br&gt;C. Be careful of sharp edges&lt;br&gt;D. Remove protective cover</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Walk to Patient table</td>
<td><strong>Check safety lockout</strong>&lt;br&gt;A. Place instruments A &amp; B on prep table&lt;br&gt;  - Instrument A into top&lt;br&gt;  - Instrument B into side</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Bacterial Inspection Operation</td>
<td><strong>1. Step off safety mat</strong>&lt;br&gt;A. Turn on ultraviolet light&lt;br&gt;Note: if bacteria is observed dispose of both instruments</td>
<td></td>
</tr>
</tbody>
</table>

**Note:**
- Location A
- Location B
- Tray
- Local A/B
- Patient One
- Column R7

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Standard Work - Check Sheet

A standardized worksheet does not need to be a large or even a complex document as it simply can be a diagram or check sheet.

CHECK THIS LIST!

- Pacemaker/Cardioverter/Defibrillator
- Aneurysm (brain) or Aortic (heart) Clip
- Permanent Hair Implants/Clips
- Implanted Spinal Cord Stimulator/Neurostimulator
- Fractured Bone Treated with Metal
- Hearing (cochlear/stapes) Implants
- Artificial Heart Valve
- Metal Fragments in Eye, Head or Skin
- IUD
- Eye Implant
- Nicotine Patch
- Medication Patch
- Stent
- Implanted Pump
- Shunt
- Wire Sutures
- Shrapnel
- Joint Replacement
- Pregnancy
- Vena Cava Filter
An Example of Good Standard Work

**Dressing Change Standard Work**

1. **Set up work work Space**
   - Hand Hygiene
   - Open Drape
   - Open Dressing Kit
   - Drop Biopatch

2. **Prepare People**
   - Adjust Bed
   - Don Masks (nurse), (patient)
   - Clean Gloves

3. **Remove Dressing**
   - Remove with alcohol
   - Discard Trash
   - Wash Hands

4. **Clean site**
   - Apply Sterile gloves
   - Chloraprep 30 seconds
   - Allow to dry 30 seconds

5. **Apply New**
   - Apply Biopatch
   - Outline Dressing
   - Apply Dressing
   - Seal Dressing
   - Apply Strips in X and label

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Visual Management

• In Human Communication
  • 7% is achieved through WORDS
  • 33% is achieved through TONE OF VOICE
  • 60% is achieved through VISUAL CUES

• Some Examples of Visual Cues:
  • Use of Colors
  • Use of Icons
  • Use of Pictures
  • Use of Symbols
Visual Controls

- Used to eliminate waste – make instructions and performance standards/expectations clear so that deviation from expectations is immediately detectable

- You use visual controls everyday
**Visual Controls – Unit Whiteboard**

<table>
<thead>
<tr>
<th>Room #</th>
<th>ID</th>
<th>Status</th>
<th>Dx/DC</th>
<th>Physician</th>
<th>RN</th>
<th>NA</th>
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<tr>
<td>1224</td>
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<td>Meds Only</td>
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<td>Banez</td>
<td>NDEMI</td>
<td>Eddie</td>
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<tr>
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<td>DEL</td>
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<td>Abovion</td>
<td>NDEMI</td>
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<td></td>
<td>Wong</td>
<td>TANYA</td>
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<tr>
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<td>NIS</td>
<td>Han</td>
<td></td>
<td>Sylvia</td>
<td></td>
<td></td>
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<tr>
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<td></td>
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<tr>
<td>1238-2</td>
<td>BON</td>
<td></td>
<td>5/23</td>
<td>Han</td>
<td>Sylvia</td>
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<td>4/19</td>
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<td>RON</td>
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</table>

- **Room #, Patient ID & Gender** (Red: ♀, Blue: ♂)
- **Physician, Nurse, CNA, Patient Status**
- **Anticipated Discharge Date** so that team is aware of it & works towards it
- **Blanks indicate open beds**

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Visual Controls – Management of Supplies

Item & Ordering information

Identify the item

Signal that indicates that replenishment is needed
Visual Controls - Management of Equipment

Identifies:
- what equipment is stored
- storage location
- how many are to be stored/in circulation
Visual Controls - Tracking Patient Care Processes

**Before:**
Which patient is next? Which patient is in which phase of treatment?

**After:**
Visual board removes the wasted motion from questions; know patient’s treatment status by file color.
Visual Controls – Performance Dashboard
Various Types of Visual Controls

- **Status/Information Boards**: snapshot of status e.g. unit census board, bed availability

- **Dashboards**: should be clearly defined, simple to produce, easy to understand and include a combination of performance metrics designed to:
  - Facilitate achievement of objectives
  - Provide feedback, enable awareness and learning

- **Process Control Tools**
  - Service Boards
  - Skills Matrix – snapshot of employee training

- Ensure visual displays are in the place where they are used and needed; and the related instructions are in the place where the visual displays are used and needed
Build Visual Controls into the Workplace

- Visual Workplace is the use of controls that enable an individual to immediately recognize the expectation/standard and any deviation from it.
  - Lines, Shadow Boards
  - Labels and Signs
  - Size of Container
  - Color Coding
  - Flags, Lights
  - One Point Lessons
Error Proofing “Pokayoke”

- People are an essential ingredient in any work, and people make errors, but errors can be eliminated.
- People will make fewer errors if their work is based on the principle that errors can be prevented.
- The most effective way to prevent errors is through Mistake Proofing Devices/Procedures.
- Mistake Proofing fixes the source/root cause of the problem within the process rather than working on the symptom and/or blaming the person.
- Audits are not part of this solution. Audits are a “just-in-case” remedy. They are waste. If you build in methods to prevent mistakes, you don’t need audits.

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Examples of Error Proofing

Medical Gas outlets – color coded with distinct connectors that eliminates wrong connections

NG Tube cannot be connected to IV Port
Examples of Error Proofing

Size and shape of pills serves as a guide to which medication should be dispensed, or taken by the patient.

Color of label, text/font used to distinguish different dosages e.g. packaging redesign of high dose Heparin, red color and vial wrap

Wrist bands are scanned to match meds/procedures/tests to patient ID.
When you can’t Error Proof

- Use colors and color-coding
  - Credit card receipts (the customer gets the yellow copy, the merchant gets the white copy)
- Use shapes
  - Store different types of parts in different shaped bins
  - Notch a stack of forms so it’s easy to tell if the forms are out of order
- Use auto-detection
  - A computer spell checker
- Use Work flows with fewer hand-offs
- Use effective data collection formats
  - If require date and time in a specific format, provide specific fields; limit free text, use checkboxes
- Use checklists
  - Start-up / change-over checklist

Make it easier to do the right work!
The 5S System

- Workplace Organization and Transformation to remove all obstacles to flow in the physical workplace and create a safe, ergonomic environment. Captures many elements of Lean:
  - Waste reduction
  - Uninterrupted flow of materials and information
  - Standard work
  - Visual controls
  - Engagement of all staff
- Simple to understand but challenging to do because it requires people to change their behavior
- To Learn 5S you have to do 5S

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The 5S System for Workplace Organization & Transformation

1. Sort
- When in doubt, you must move it out

2. Set in Order
- A place for everything, with everything in its place

3. Shine
- Make it clean & keep it clean

4. Standardize
- Create control with a visual show

5. Sustain
- Maintain the gain & forget the blame

When in doubt, you must move it out
A place for everything, with everything in its place
Make it clean & keep it clean
Create control with a visual show
Maintain the gain & forget the blame
The 5S System consists of 5 activities beginning with “S”

1. **Sort** - sorting through the contents of an area and removing unnecessary items.
2. **Set in Order** - arranging necessary items for easy and efficient access, and keeping them that way.
3. **Shine** - cleaning everything, keeping everything clean, and using cleaning as a way to ensure that the area and equipment are maintained, as they should be.
4. **Standardize** - creating guidelines for keeping the area organized, orderly, and clean, and making the standards visual and obvious.
5. **Sustain** - education and communication to ensure that everyone follows the 5S standards
You need 5S if you have identified:

- Searching
- Excess movement (walking between buildings/floors, etc.)
- Clutter
- Confusion
- Unnecessary motion
- Contamination
- Request for more space
- Physical obstacles
- Safety or ergonomic issues
- A depressing work space
1. **Sort**

**Goal:** To remove waste; create a safer work area; gain space; make it easier to visualize process.

**Steps**

1. Start in one area, then sort through everything.
2. Sort out necessary and unnecessary items.
3. Discuss removal of items with all persons involved.
4. Store often used items at the work area and infrequently used items away from the work area.
5. Dispose of items that are not needed.
6. Use decontamination/environmental/safety procedures.
7. Items that cannot be removed immediately should be tagged. A Red-Tagging strategy is recommended.
8. Use movers, housekeeping, etc. if necessary.
5S

Implementing Sort - Continued

Red Tagging – Putting red tags on items that need to be evaluated as being necessary or unnecessary.
- Is the item needed?
- If it is needed in this quantity?
- If it is needed, does it need to be located here?
- Use only one red tag per item
2. Set in Order

**Goal:** Visually show what is required or is out of place; create more efficient to find items/documents (silhouettes/labels); save time, by not having to search for items (point of use); create shorter travel distances (motion)

**Steps**

1. Identify all necessary items.
2. Arrange things that are used together next to one another.
3. Arrange sharable items in a central location (eliminates excess).
4. Create a designated place for everything.
5. Use labels, tape, floor markings, signs, shadow outlines to designate where things belong.
5S Sort Examples

Before 5S

After 5S
Example of Sort & Set in Order

Use 5S to...

Reduce Searching

Before: Removed unnecessary items, designated locations for necessary items

After: Charged and easy to locate
Example of Sort & Set in Order

Sorted, color coded & labeled bins
3. Shine

**Goal:** create a clean workplace that reflects the quality of the products/services you want to produce; eliminate dust and dirt that contributes to contamination & potential health hazards; easily identify abnormal conditions.

**Steps**

1. Everything in its place makes time available for cleaning.
2. Create a list to identify individual responsibilities for cleaning.
4. Standardize, 5. Sustain

Goal: create a consistent and standardized method for doing work; maintain the workplace at a level which uncovers and makes problems obvious; fosters continuous assessment & improvement activities; and sustains sorting, storage and shining activities.

Steps

1. Ensure all work stations for a particular job are identical. All employees doing the same job should be able to work in any station with the same tools that are in the same location in every station.

2. Develop check lists (standard operating procedures) for each role/function. Make sure everyone understands exactly what their responsibilities are in each step of the process (training).

3. Align incentives so everyone is rewarded for achieving the overall goals and objectives of the organization.
Example of Standardize

Before:

Inpatient Units: Clean Supply Room Redesigns

Define Standards for Consistent Results

After:

Photo label prevents intruder items

To Learn 5S you have to do 5S
In Improvement Tools we learned
• Transitioning from the Current State to the future “Ideal State” and the importance of using countermeasures to enable this
• About improvement tools to use as countermeasures: Standard Work, Visual Management, Error-Proofing, and 5S

In Implementing & Controlling improvements will learn:
• How to implement improvements
• Why people resist change
Sources/References

Improvement Tools: Supplementary Information

Improvement methods and tools for your reference (we were not able to cover in detail in our class today):
Kanbans - Improving Materials & Information Flows

Kanban (signal) - Pull System, to ensure that work and materials moving through the process are only those needed – no more and no less.

- A system where the resources flow by replacing only what has been consumed - work or materials are only moved when the next stage requires it
- Tells managers/workers what to produce/provide, when to produce/provide it, and how much to produce/provide

- Types of Kanbans:
  - Container/Space (inbox/outbox)
  - Computer (electronic)
  - Card
Example of Kanban

Identify the item

Signal that indicates that replenishment is needed

Item & Ordering information
Example of Kanban

Trigger an Activity

Before:

Which patient is next?

After:

Visual board removes the motion from questions

Orthopaedics Visual Patient Tracker

Color Code
- Patient in X-Ray
- X-Ray Complete
- Patient on Stretcher
- Patient in Castroom
- Filling out Paperwork
Example of Kanban

Before:

Gain Flow

Lab Control: Specimens pre-sorted at arrival

After:

Couriers now start sort process for flow

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Benefits of the Pull System

- **Ease of Control** - Prioritizes the most time sensitive orders and accurately estimate a “promise time/date” to the customer.
- **Efficiency** - Can attain the same throughput as a push system with less Work-In-Process (WIP) and shorter cycle times.
- **Productivity** - Less WIP means less non-valued items to get in the way.
- **Stability** - Pull systems rely on setting easily controllable WIP levels, creating a more manageable process. Better manages the flow of work to meet the demand.
# Advantages of Pull vs. Push Systems

<table>
<thead>
<tr>
<th>Element</th>
<th>Pull System</th>
<th>Traditional Push System</th>
</tr>
</thead>
<tbody>
<tr>
<td>Work-In-Process</td>
<td>Controlled through use of Kanban</td>
<td>Forced into the system</td>
</tr>
<tr>
<td>Schedule Basis</td>
<td>Actual Usage</td>
<td>Forecast Usage</td>
</tr>
<tr>
<td>Lot Sizes</td>
<td>Small Lots</td>
<td>Large Lots</td>
</tr>
<tr>
<td>Problem Status</td>
<td>Visual Control</td>
<td>Hidden Problems</td>
</tr>
<tr>
<td>Amount of Waste</td>
<td>No Waste</td>
<td>Waste</td>
</tr>
<tr>
<td>Communication</td>
<td>Good Communication, at a Glance</td>
<td>Poor Communication</td>
</tr>
<tr>
<td>Accuracy</td>
<td>Precision</td>
<td>Approximation</td>
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Question
How can you eliminate interruptions in flow due to poor process methods and procedures?

Method
Process Smoothing - Continuous flow

Lean Tools
• Flow Design & Process Smoothing
• Load Leveling (Heijunka)
• One Piece Flow
• Sequential Design
• Set-up Reduction
What Is Flow Design (Process Smoothing)?

• The goal of Flow Design is to create a continuous flow of work, whether it be product, service, or administrative work.

• This requires sequencing work without breaks, stops, or interruptions from beginning to end. In order to accomplish this we must:
  • Eliminate batching – batches create WIP, time delays, unbalanced processes, long lead times.
  • Eliminate bottle-necks - anything that stops flow creates waste, and costs money.
  • But Flow Design goes beyond just flow. It also creates a process that has a smooth flow (no slow downs), which implies that it is a uniform process that does not deviate from standards.
When you need Flow Design

If you have:
• Redundancies and rework
• Unnecessary processing/routing
• Others reviewing work done by someone else or work that was done previously in the process (inspections)
• People doing things “just in case”
• Too much movement (walking/toggling between multiple screens) between operations or functions
• People doing anything that doesn’t add value
• Batching / Work In Process
• Delays (for information, tools, equipment)
• Waiting (Customers waiting for products/services)
Steps for Improving Flow Design

1. Link each activity into most efficient sequence.
2. Stage work to achieve the quickest turn-around.
3. Use smaller batches.
4. Eliminate work in process.
5. Eliminate routing and/or reduce conveyance distance.
6. Eliminate non-value added activities.
7. Combine steps or activities where-ever possible.
8. Reduce/eliminate hand-offs between functions, and/or business units.
9. Identify any “external” (upstream, or off-line) activities that might shorten lead time.
10. Identify opportunities for parallel activities.
11. Revise work schedules, policies, and union contracts, etc. to flex for increase/decrease demand.
Goal for Creating Flow Design

• Line up all steps that truly create value so they occur in rapid sequence, and ensure the process is:
  • Capable – right every time
  • Available – Always able to run
  • Correct – With capacity to avoid bottlenecks (right sized tools, etc.)
Load Leveling/Service Leveling

Eliminate a step, combine steps, make steps more efficient

Leveling - The process by which you evenly distribute the work elements between functions (people) within the process in order to meet demand without starts & stops, delays, buildups, etc.
How to Accomplish Load Leveling

- Assign work and personnel to keep work flowing from operation to operation without stopping.
- Ensure that each operation can handle its assigned “piece” of work within the allotted demand time (TAKT Time).

130 sec. to receive order
170 sec. to check credit
300 sec. to finalize/ship

Any ideas?
What is One Piece Flow?

• The sequencing of activities in a one-for-one process, where one part/order (or a very small batch) goes through an operation (step) and is immediately passed to the next operation (step).

• Steps are sequenced by reorganizing work so the activities assigned to each function have the same processing time.
Why Use One Piece Flow?

- One Piece Flow minimizes work in process by eliminating batches of work in progress.
- One Piece Flow eliminates re-occurring defects because the defects will be visualized in a much shorter time period.
- Eliminates travel distance, build-up (bottlenecks) to create shorter lead times resulting in increased responsiveness to customers.
- One Piece Flow and Standardized Work are generally implemented together because each operator is a multi-functional worker capable of performing multiple processes.
- In order to effectively train workers and keep maximum flexibility, standardized procedures have to be developed to ensure quality.
Overcoming Barriers to One Piece Flow

• Process cycle times are unstable or variable, creating imbalance between workers. Examine process cycle times through direct process observation, break the work into smaller work elements, remove waste, and recombine steps.

• We have occasional work that interrupts the process. There is something in TPS called the Water Spider (registry/temp/relief workers) which acts as a line support function to handle relief work. When it is not practical to have a Water Spider, you can have managers, or team leaders help in these areas. Failing that, create Standard Work to reflect the changing work sequence and work balance every so many pieces for these types of recurring tasks.
What is Setup Reduction?

- **Definition** – The time between the completion of one type of task and the beginning of another type of task.
- **Setup time reduction** is often one of the greatest barriers to reaching Continuous Flow.
- **Examples:**
  - Turning your computer on in the morning
  - Preparing the OR for surgery
Benefits of Setup Reduction

- Continuous flow is enabled
- Capacity is increased
- Response time for customers is shortened
- Improved flexibility
- Improved small lot capability and less inventory because shorter runs are feasible
Set-Up Reduction

Step 1: Document the setup and separate activities into serial and parallel

Step 2: Convert Serial activities to Parallel activities where possible

Step 3: Streamline remaining serial events (Simplify, Reduce, Eliminate)

Step 4: Implement quick changeover
Question
• How can you redesign the layout for best flow, efficiency, and communication?

Method
• Equipment Layout and the multi-function worker for flexible workforce concept and shortened lead times.

Lean Tools
• Sequential Design & Equipment Layout
• Point of Use Design
• Multi-function Worker
Sequential Design

- Sequential design (also called cell design, or multi-process handling) allows work to be quickly adjusted to meet changing volume/demand.
  - Sequential arrangement of workers and equipment performing steps in the process along the desired flow of the process.
  - Cells perform all the operations necessary to complete a product/service, or major production sequence.
  - Last operation placed close to the first.
  - Designed for quick and easy exchange of equipment and people.
Improving Equipment Layout

1. Link operations and equipment into the most efficient combinations to maximize value-added content while minimizing waste.
2. Eliminate work stagnation in and between processes.
3. In order to really get and hold the benefits of flow production, change your organization from a functional structure to a product or process focused, cross-functional structure.
4. These same principles apply even to the “virtual layout,” that is, the way files and programs are organized and accessed on your computers.
Point of Use Design

• The Lean practice of designing a work station, giving a worker what they need, where they need it – instead of delivering it or requiring them to travel, or request it from somewhere else.
• This practice eliminates walking, searching, waiting, and movement waste.
• Think about a short-order cook’s work station.
Point of Use Design - Examples

Equipment is positioned for ease of bathing at home.

Tailor the size and number of sterilizers, washer-disinfectors and other equipment to match the requirements of the OR.

Electronic health record – medical information available when needed – where needed.

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Multi-function Worker

• Based on “process” design rather than “function” design.
• A worker is capable of performing more than one function or job in a process.
• Moves from a philosophy of isolated workers to team work.
• The team will “own” the process.
• Requires cross-training.
What If I Can’t Control My Work In-Process?

- Hospital ED
  - Problem: Surge of patients creates a limited number of ED beds.
  - Solution: as patients arrive, their status is reviewed for priority:
    - Acute patients are “fast tracked” admitted directly to ICU/CCU, etc.
    - Kanban signals management to add resources throughout the house to accommodate the surge.
Materials Management

How do you get required materials and information to their “point of use” at the operation?
✓ Material close to POU, but not in walking path
✓ Present parts so person can use both hands at same time
✓ Do not have people restock their own material
✓ Try to keep materials within arm’s length
✓ Standardize amounts at POU – small amounts
✓ Do not store out-of-cycle work in work area
✓ Use Kanban to replenish (only replace what is used)
✓ Size containers for easy use or as pack-out quantity
✓ Do not interrupt work cycles to replenish parts
Kitting

• Materials/supplies are bundled, wrapped, and delivered to point of service/production prior to beginning work (pre-staged)
• Includes information, forms, equipment, and supplies.