

Going the Extra Mile with Value Stream Mapping: New Ways to Find More Hidden Costs in Your Lab



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Value Stream Mapping

Put science on your side.

ADD-00002298

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2011
**Certified
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The Global Voice of Quality™



• **June 2005 – Present**

- ASQ Six Sigma Black Belt
- Lean Six Sigma Blackbelt
- Workflow Consultant
Project Management

• **2002 – 2005**

- Supervisor Specimen Processing

• **1993 – 2005**

- Core Laboratory Supervisor

• **1989 – 2002**

- Supervisor Special Chemistry
- Supervisor Infectious Testing

• **1977 – 1989**

- MT, Special Chemistry, Infectious Testing,
Chemistry

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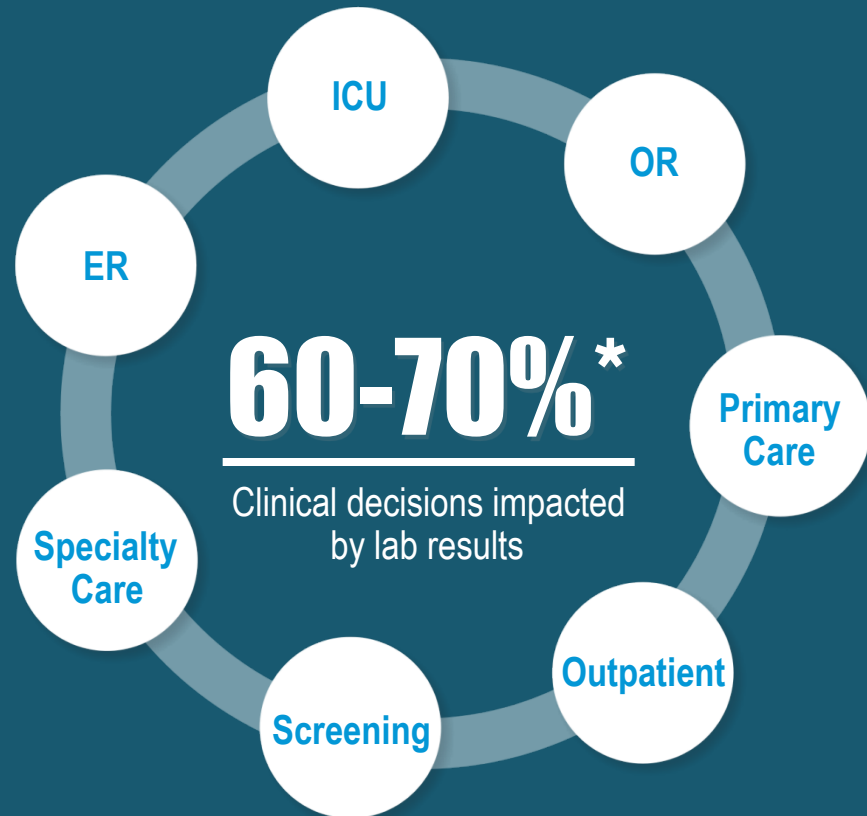
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Diagnostics Has System-Wide Impact

Diagnostics influence critical outcomes in nearly every department and facility.

<5%*

Typical lab need
from system budget



*Forsman, Rodney W. "Why is the laboratory an afterthought for managed care organizations?" Clinical Chemistry. 42(5), 1996. 813-816.

• **See Also:**

- Clinical Laboratory Tests: Which, Why, and What Do The Results Mean? Frank H. Wians, Jr., PhD, MT(ASCP), DABCC, FACB (Department of Pathology, University of Texas Southwestern Medical Center, Dallas, TX)

DOI: 10.1309/LM4O4L0HHUTWWUDD

<http://labmed.ascpjournals.org/content/40/2/105.full.pdf+html>

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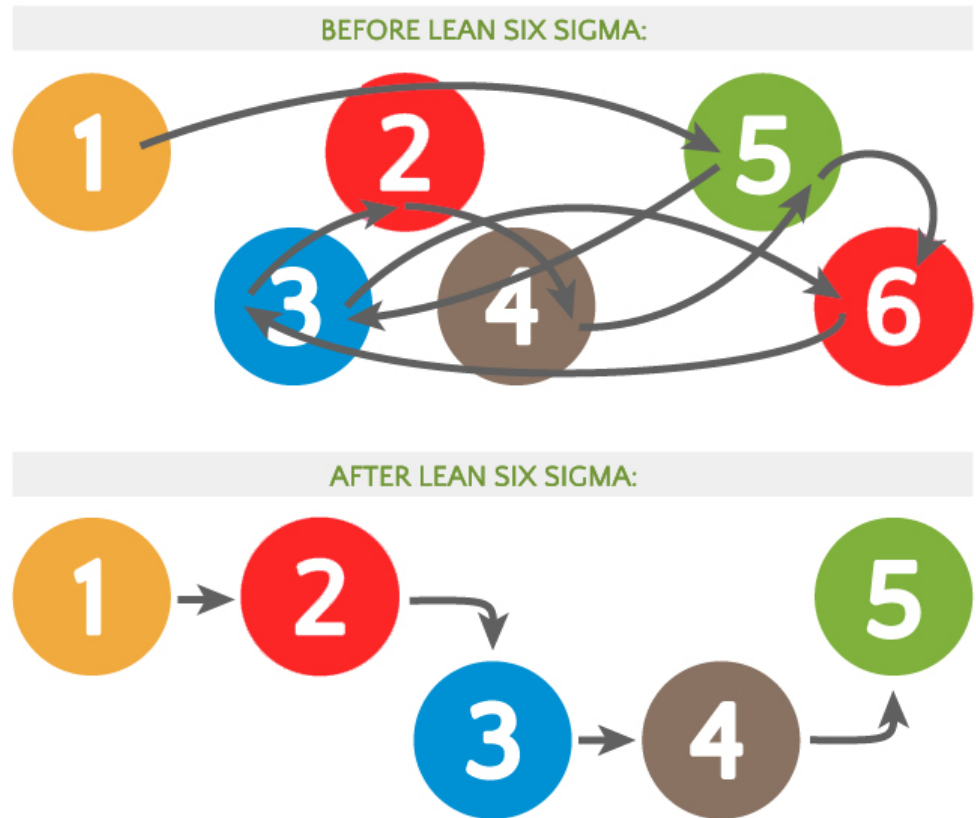
Abbott
A Promise for Life

What is LEAN?

Lean Six Sigma is a proven method of improving business efficiency and effectiveness

Lean is simply

- A method of streamlining a process, resulting in
 - Increased revenue
 - Reduced costs
 - Higher quality
 - Reduced Turn Around Time
 - Improved customer satisfaction
- The removal of “waste”, which is an activity no required to complete a process



LEAN: Types of waste

Looking at “W.O.R.M. P.I.I.T.” waste



WAITING

Wasted time waiting for the next step in the process



OVERPRODUCTION

Production that is more than needed or before it is needed



REWORK

Efforts caused by defects, scrap, and incorrect information



MOTION

Unnecessary movements by people (e.g. walking)



EXTRA PROCESSING

More work or higher quality than is required by the customer



INVENTORY

Excess products and materials not being processed



INTELLECT

Underutilizing people's talents, skills, & knowledge



TRANSPORT

Unnecessary movements of products & materials.

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LEAN: DMAIC

LEAN and Six-Sigma Processes work together with common tools to be LEAN Six-sigma

Six Sigma	<div>  <p>DEFINE Define the problem</p> </div> <div>  <p>MEASURE Map out the current process</p> </div> <div>  <p>ANALYSE Identify the cause of the problem</p> </div> <div>  <p>IMPROVE Implement and verify the solution</p> </div> <div>  <p>CONTROL Maintain the solution</p> </div>
LEAN	<div>          </div>
Common Tools	<ul style="list-style-type: none"> ▪ Non Value Add vs Value Add ▪ Optimal Batch Sizing ▪ Value Stream Mapping ▪ Layout Design ▪ 5 S's ▪ Waste elimination ▪ Mistake Proofing ▪ Visual Controls ▪ TAKT Time

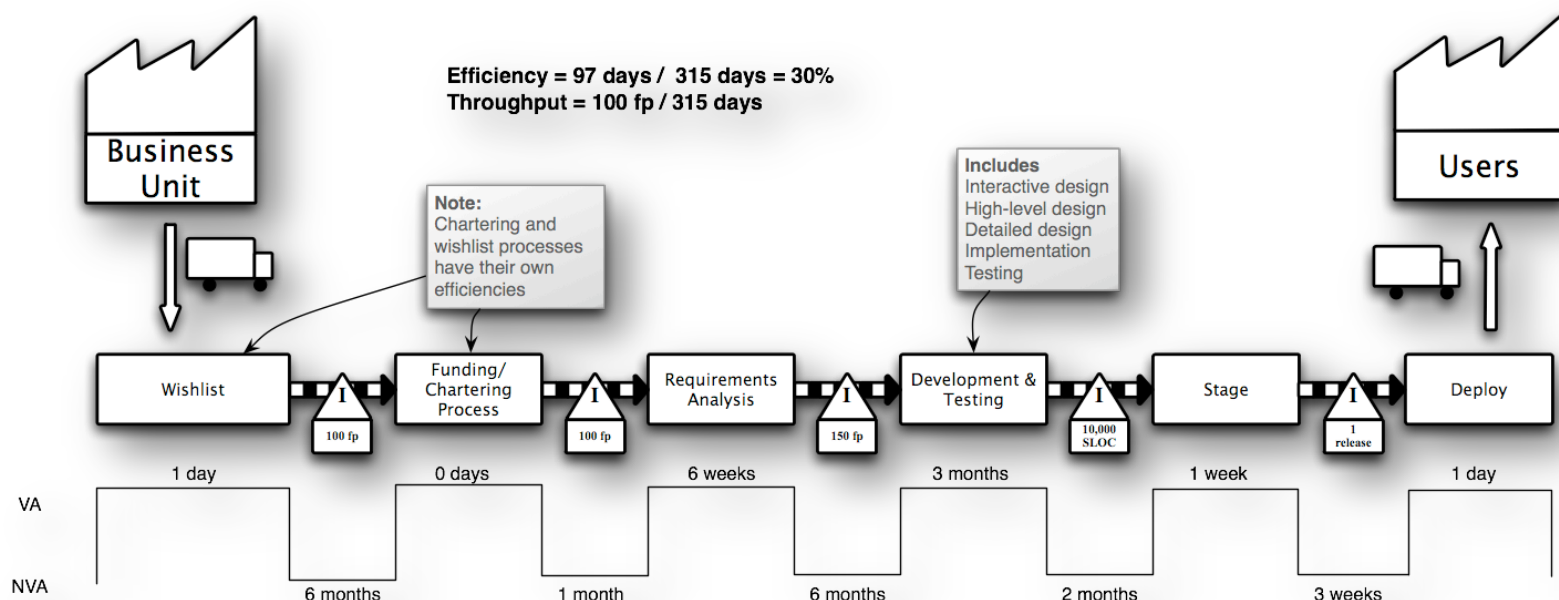
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LEAN: Using Data to Improve Flow

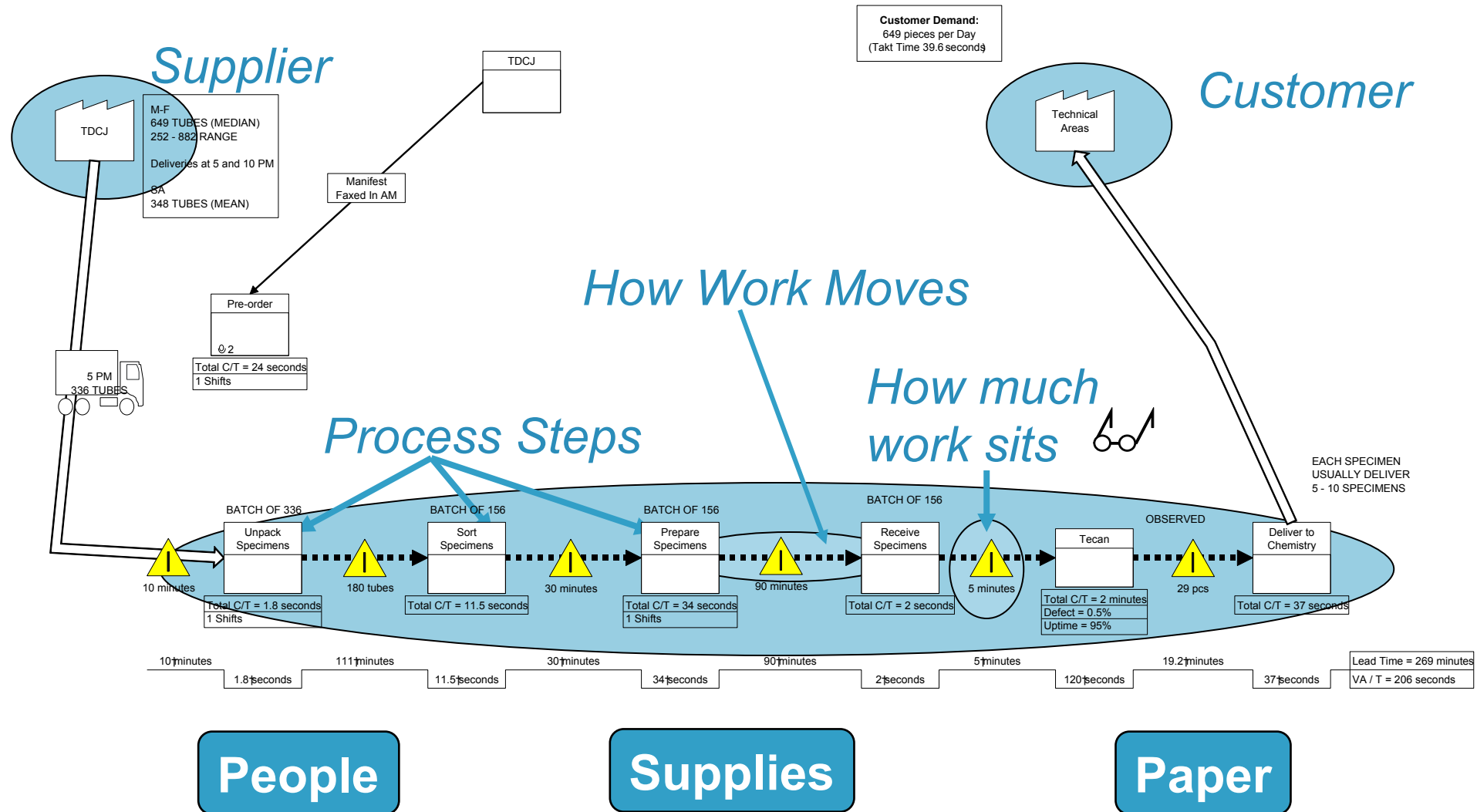
Value maps allow data to be represented visually to better identify waste/processes

- Build Process and Value Stream Maps
 - Understand how the process runs.
 - Know where the process has stoppages and rework.
- Remove waste from the process.
- Create a Visual Workplace.



Example Value Stream Map

The map below outlines a typical lab value stream map



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LEAN: Go to the GEMBA

Gemba Kaizen is similar to “MBWA” - Management by Walking Around

■ Gemba (現場)

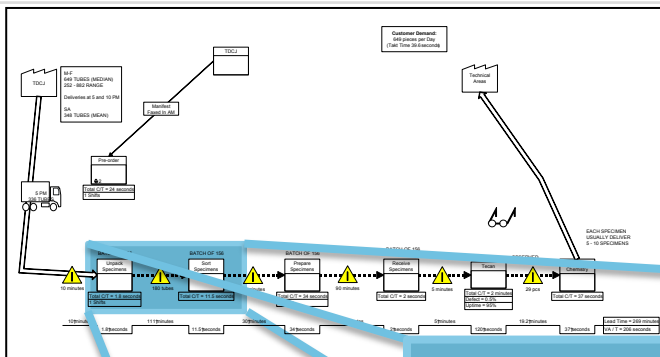
- in Japanese means “the actual place” or “the real place”
- In business, Gemba refers to the place where value is created and the general notion is that the best improvement ideas will come simply from going to the Gemba (‘bottom-up’ vs. ‘top-down’)



現場

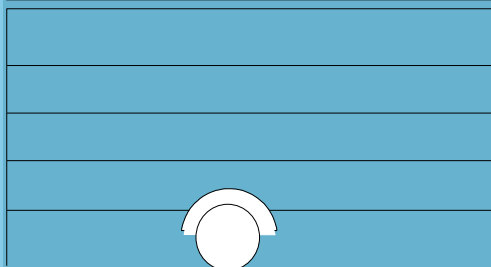
LEAN: Go to the GEMBA

As an example, we can look at the process of specimen receiving within the value map

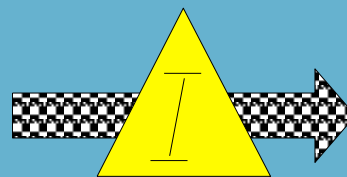


Name: Runner
Activity: In-House Specimen Distribution
Location: PTS (1)

1. Remove bags from PTS tube
2. Distribute to Receiving stations
3. Deliver to lab sections

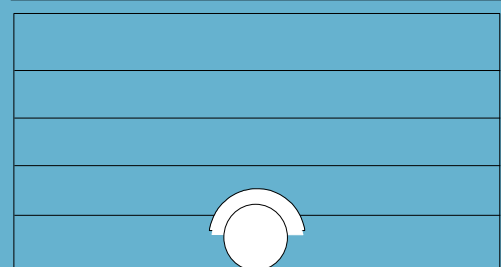


Runner 1



Name: In-House Receiving
Activity: In-House Specimen Processing
Location: PC workstation (2)

1. Match and Check tube ID
- 2a. Scan Barcode **QR**
- 2b. Manual entry from collection list.
3. Sort to rack
4. Centrifuge
5. Pour-off



Lab Assist 2

LEAN: Understanding the data behind the map



Time maps between steps can quickly identify areas of waste in large and small scale

Workstation Details	1. Runner	1. In-House Receiving	1. Secretary
Lab Location	Specimen Management (SM)	Specimen Management (SM)	Specimen Management (SM)
Room Location	ED / in-house PTS	Right of ED / in-house PTS	Mail-outs
Day shift staff	1	2	1
Evening shift staff	1	2	
Night shift staff		2	
# Workstations	1	2 - 1 Stat, 1 Routine	1
Equipment		LIS, Two 172 spot centrifuge; Two microtainer centrifuges: shared w send-outs	Phone, LIS
Work Elements			
1	Manages PTS	Empty Bag	Manage Add-ons
2	Distributes to receiving stations	Match and check tube label w collection sticker	Answer phone
3	Delivers received samples to lab sections	Scan if hand held	Answer window
4	Load/Unload centrifuges	Manually enter if not hand held	
5	Maintains centrifuges	sort to rack	
6	AP mail	centrifuge 5 minutes	
7	retrieves dry ice	Pour-off Aliquots	
8	organizes storage room	Deliver	

LEAN: Understanding the data behind the map



Time maps between steps can quickly identify areas of waste in large and small scale

Activity	Sum of Tubes	Average of Cycle Time hh:mm:ss	Value Added	Waste - hh:mm:ss								
				Waiting	Over-Production	Re-Work Errors	Motion	Extra-Processing	Inventory	Intellect	Transport	
Arrives PTS												Waste Total h:m:s
Window Drop												
Receive Complete												
Put Labels on Sheet												
Place in Centrifuge												
Start Centrifuge												
Retrieve from centrifuge												
In-House Delivery to Lab												
Prepare add-on												
Microbiology Delivery												
Each tube experiences process time of												

Cycle Time	Tubes	Avg per Tube hh:mm:ss	Total Labor
Labor Time:			
Centrifuge Time:			
Transport Time:			
Additional Activities:			

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LEAN: Spaghetti Diagrams

Spaghetti Diagrams allow Six Sigma specialists to identify sub-optimal movements

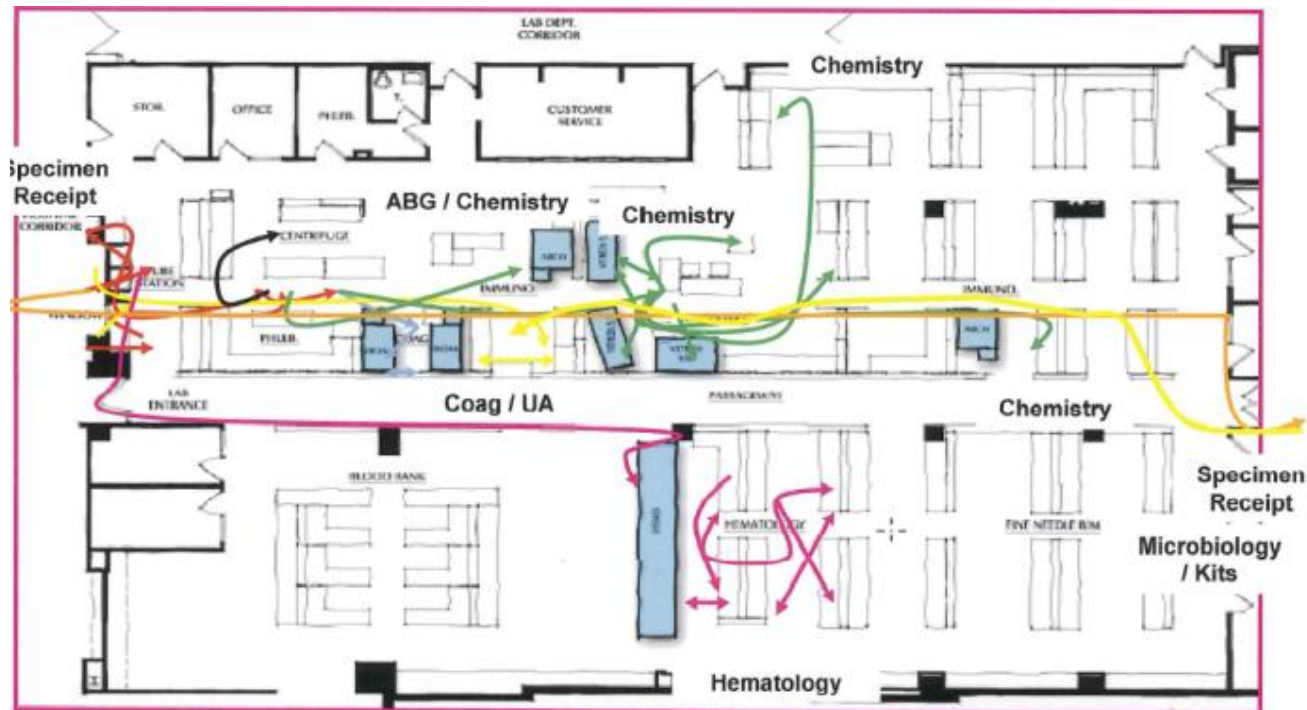


FIGURE: This is an example of a spaghetti diagram. The diagram got its name because of how it resembles a pile of tangled noodles. It shows a movement path in a room and also is used as a waste observation tool.

LEAN: How Physical Layouts Affect Efficiency



Inefficient layouts can lead to real efficiency drops which equates to increased cost

Distance between process steps

- Length of transport adds time and encourages batching / holding
- Non-linear flow may cause backtracking
- Long distances can create additional process steps

Excess drop-off points

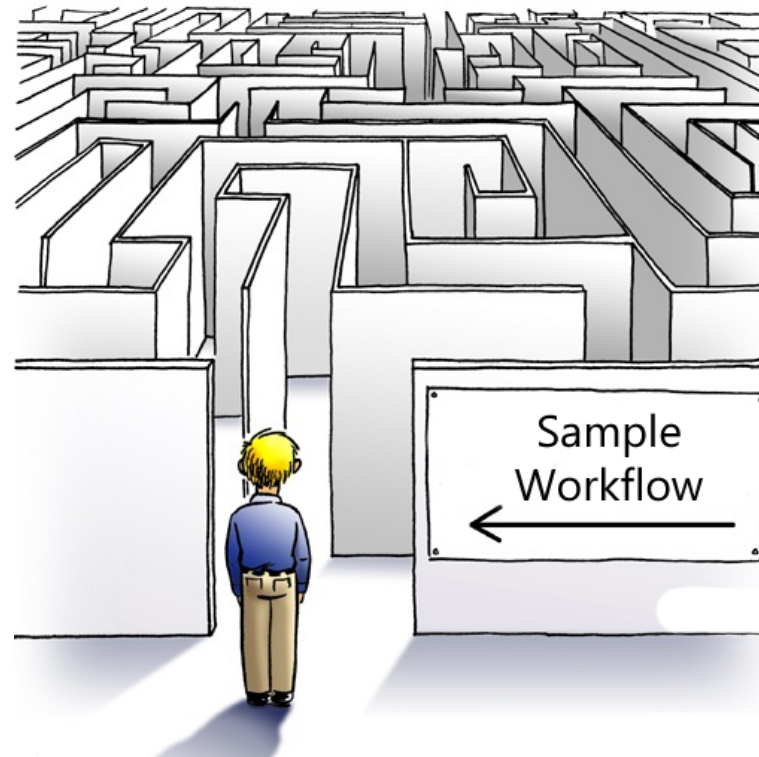
- Chemistry, hematology, coagulation, etc. located far apart

Necessary resources located far away

- Instrument printers & resulting computers
- Analyzers & reagents

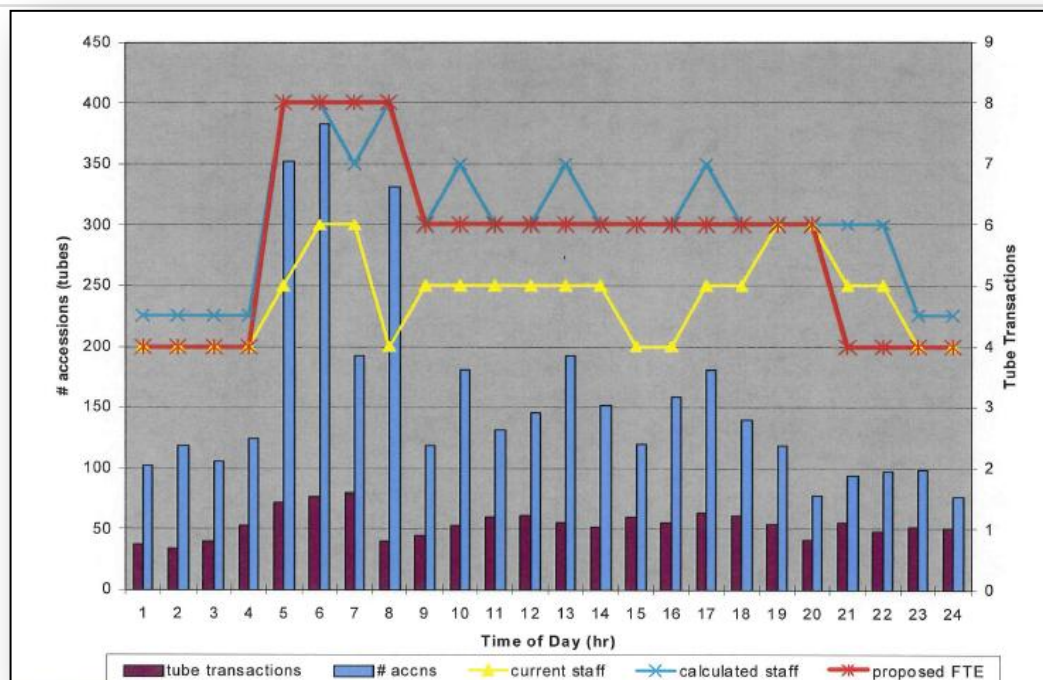
Common findings

- Congestion observed
- Placement of work tables and equipment dictate traffic flow
- Traffic patterns overlap work areas



LEAN: Workload Demand Analysis

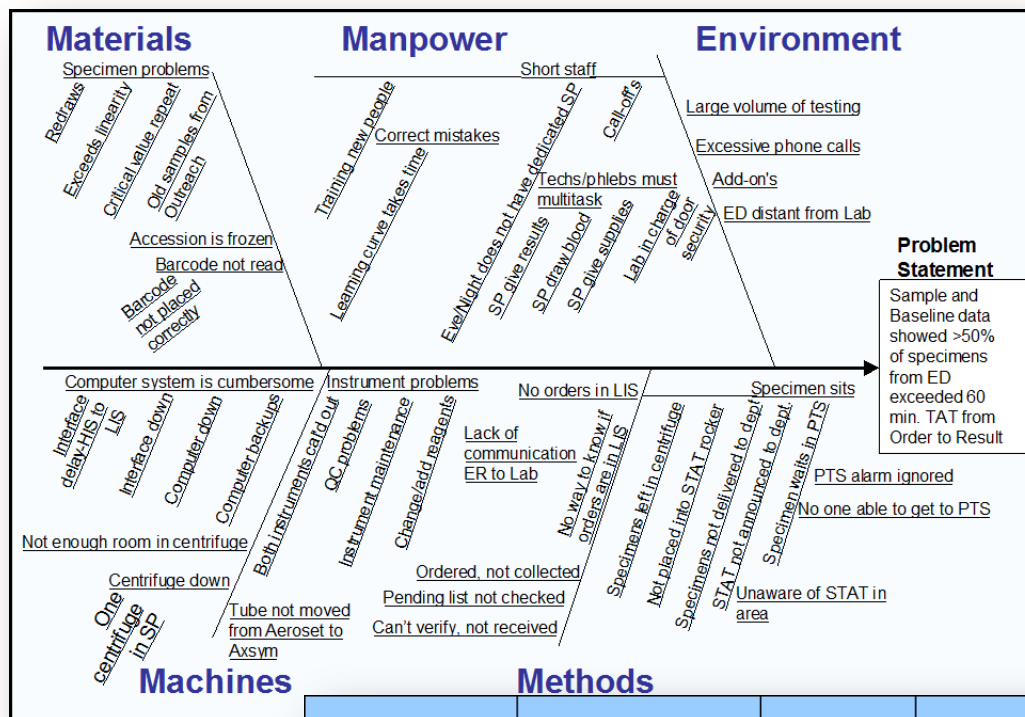
Graphing workload allows for a better matching of system demand to available resources



Automated Workcell		
FTE Type	MT	MLT
Stationed at Specimen Management and Automated Analyzers: loading and unloading specimens		1
Stationed at analyzers: "Wet" tech performing maintenance, cals, QC, manual dilutions	1	
Stationed at Computer: "Dry" tech handling results	1	
Night Shift (Mon-Fri)		
Stationed at Specimen Management and Automated Analyzers: loading and unloading specimens and "Wet" tech performing maintenance, cals, QC, manual dilutions	1	
Stationed at Specimen Management and Automated Analyzers: loading and unloading specimens and "Dry" tech handling results	1	
Night Shift (Sat-Sun)		
"Wet", "Dry" and Load duties	1	

LEAN: Moving to “Root Cause Analysis”

By asking the “5-whys” and mapping issues, previously unknown root causes may appear



Process Step or Requirement	Observed Defect	Why1	Why2	Why3	Why4	Why5	Barrier	Impact to Lean Process
Workstations continually operating based on customer demand.	leave station to centrifuge	Unable to centrifuge on APS	Reference tests not loaded to APS					Continuous flow stops
	several or all leave to go on break	Accepted practice	Unaware of impact to lean process	No formal instruction in Lean	Not included in NEO	Oversight	None	Continuous flow stops
	several or all leave to go to lunch	Accepted practice	Unaware of impact to lean process	No formal instruction in Lean	Not included in NEO	Oversight	None	Continuous flow stops

LEAN: Moving to “Root Cause Analysis”

By asking the “5-whys” and mapping issues, previously unknown root causes may appear

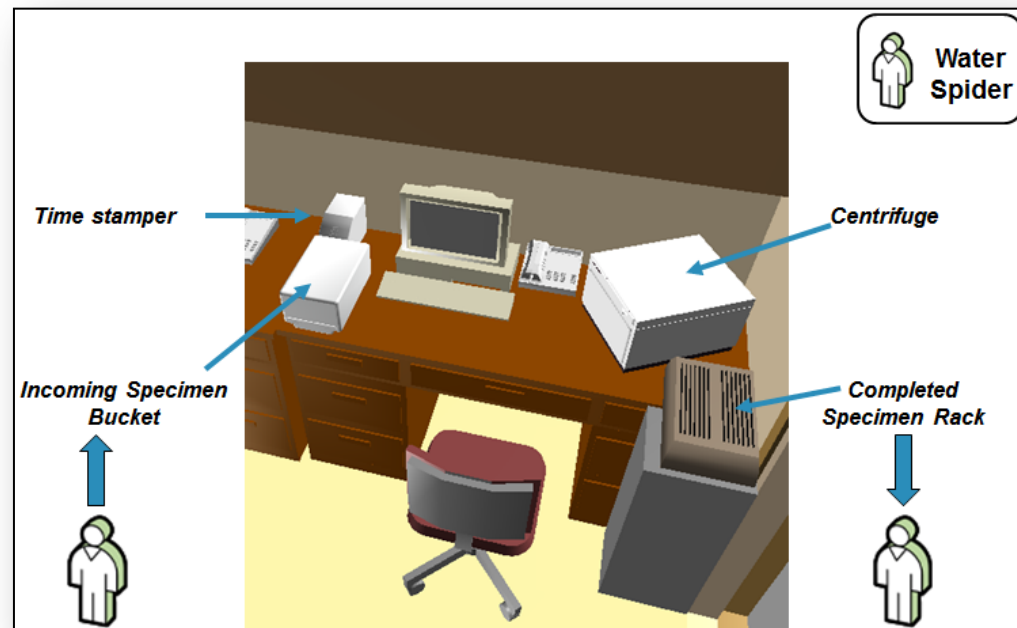
Priority Matrix Example									
Importance Rating: 10 = high importance, 1 = low importance					Enter rating in gray boxes				
Implementation Rating: 10 = low, 1 = high									
Impact Rating: 10 = high impact, 1 = low impact									
Highest Weighted Total is optimal solution									
Lean Solution	Aspect*	Cost Of Implementation	Duration of Implementation	Resources Required	Aspect*	Reduce Defects	Reduce TAT	Ability to Reallocate FTE	Weighted Total
	Aspect Importance Rating (Weight) 10 = High	1	7	5	Aspect Importance Rating (Weight) 10 = High	10	10	7	
Solution	Implementation Rating*				Impact Rating*				
Standardize Centrifuge Time to 3 minutes	10 = Low 1 = High	10	10	10	10 = High 1 = Low	1	10	1	247
Implement Customer Service for phone calls-appropriate staff for all shifts	10 = Low 1 = High	5	5	5	10 = High 1 = Low	5	5	1	232
Implement SpecTrac for coag and urines	10 = Low 1 = High	10	5	5	10 = High 1 = Low	5	5	5	220

LEAN: Specimen Processing

The work cell example below shows a “milk run” type operation

Effects of the model

- FTE Reduction
 - Staff to Demand
- Supply Reduction
- Inventory Management
 - Kanban
 - Supply Carts at Workstations
- Reduce Paper
 - Eliminate Paper where possible
 - Automate Paper Processes



LEAN: Milk Run & the Water Spider

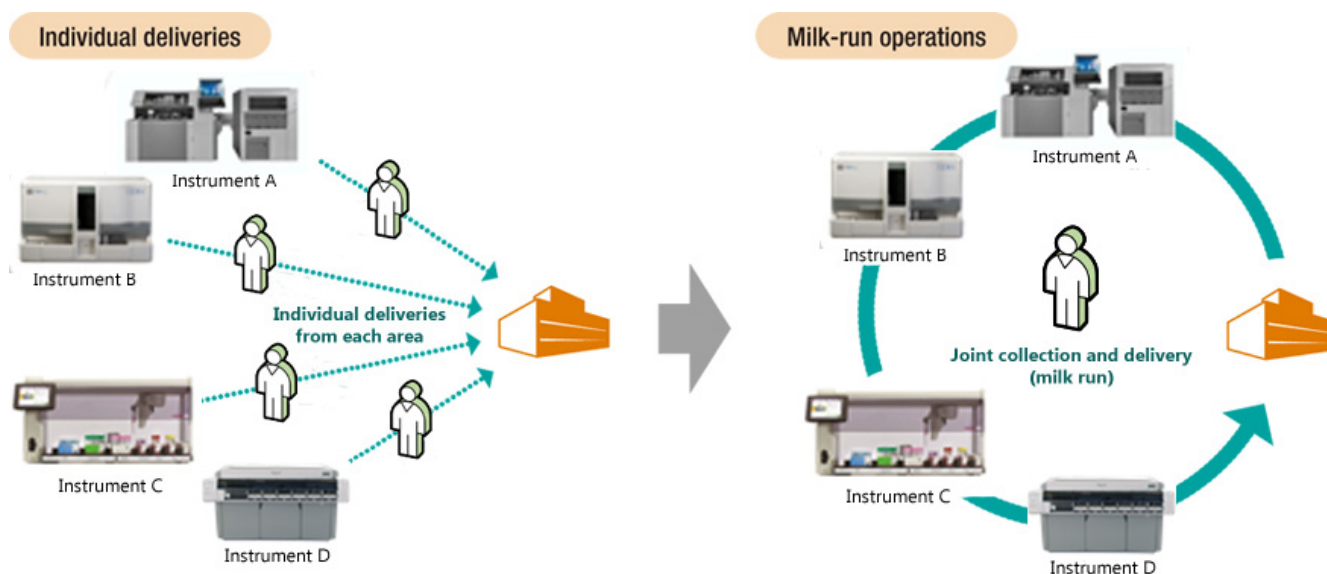
A “Milk run” and “water spider” allows for optimal lab operation

Milk Run

- Standard route, timed schedule, quantity-variable delivery of specimens and replenishment of supplies.

Water Spider

- Person assigned to support a production operation, so that others may focus exclusively on value-added work.
 - In a properly designed production cell, a water spider can raise the efficiency of the cell by as much as 90%, by allowing the rest of the production personnel to focus exclusively on value-added work

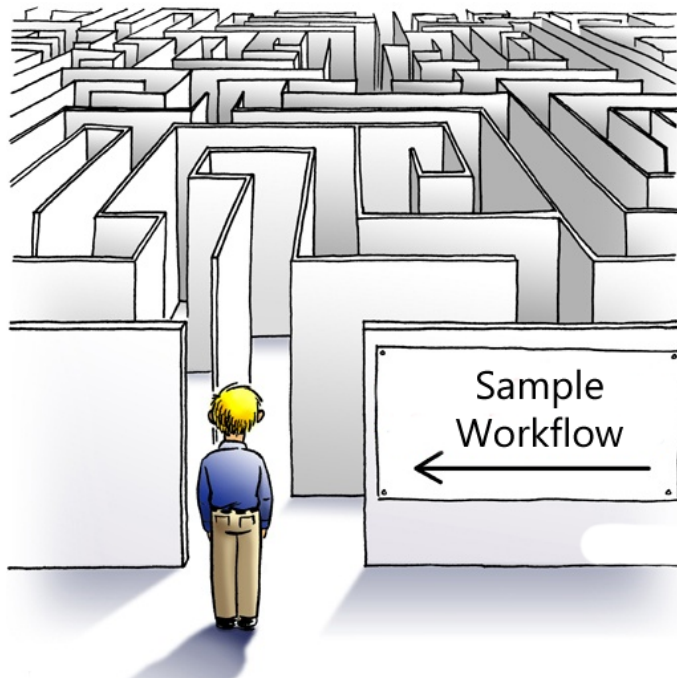


LEAN: Effects of workflow improvement

Inefficient layouts can lead to real efficiency drops which equates to increased cost

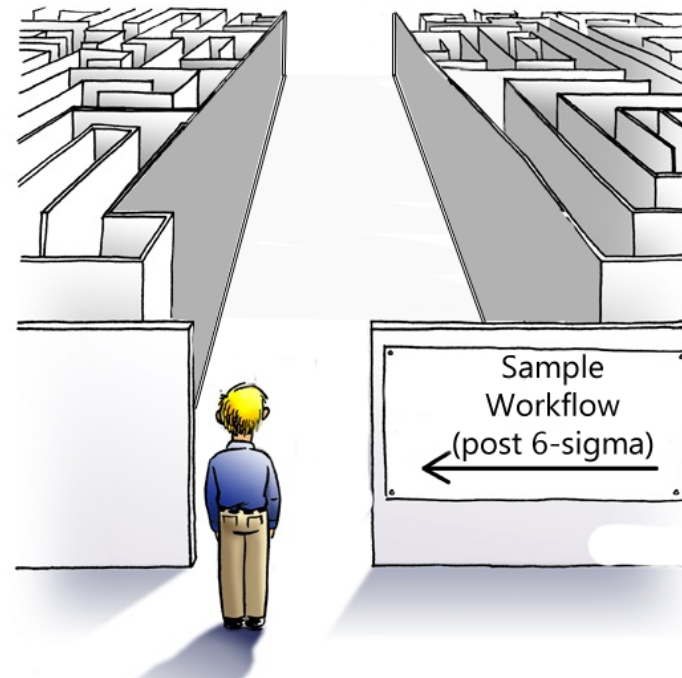
Lean Concept

- Reduce Waiting (inventory)
- Reduce Transportation
- Reduce Motion
- Eliminate rework / errors



Benefits

- Improve TAT
- Reduce labor
- Reduce errors
- Improve patient safety



The Lean Solution: Guidelines

Ensure adequate amount and capacity of equipment

- Eliminates delays waiting for centrifuges, analyzers, etc...
- Analyzer and centrifuge capacity matches sample arrival and processing patterns

STAT's should use the same process flow as routine samples

- Allows the techs to stay focused on the fewest number of tasks
- STAT's should still be prioritized at each step in the process

Consolidate testing onto the fewest platforms

- Eliminates aliquots, multiple tube draws, and/or serial tube runs
- Ensures proper utilization of labor
- Need to ensure analytic quality is maintained

Keep each tech dedicated to the fewest number of tasks possible

- Eliminates the time and mental overhead associated with changing tasks

The Lean Solution: Guidelines

Place process steps and necessary resources as close together as possible

- Eliminates transport time and delays, and discourages batching

Move samples through the process in a *continuous flow*

- Eliminates batching delays and associated re-work

Keep each tech dedicated to the fewest number of tasks possible

- Eliminates the time and mental overhead associated with changing tasks

Have each process step take the same amount of time

- Allows each tech to work on one sample or order before passing it to the next, all at the same time
- The lab operates efficiently on a “pulse”

Implementing Lean in the Laboratory



1	Discard conventional ideas
2	Think of how to do it, not why it can't be done
3	Question everything - Ask 'why' at least five times
4	Start to solve it now...immediate perfection is not expected
5	Correct mistakes at once
6	Spend money wisely
7	Best solutions surface when faced with hardship
8	Brainstorm then Try-Storm
9	Ideas are Infinite! Focus on Continuous Improvement
10	Continually Evaluate and Adjust

