HARVARD MEDICAL SCHOOL

Introduction to Lean: HMS White Belt Training

UMMHC CENTER FOR INNOVATION AND TRANSFORMATIONAL CHANGE (CITC), UMASS MEMORIAL HEALTH CARE

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Learning Objectives

- Define ‘Value’ for the customer at each step
- Develop eyes for ‘Waste’
- Stop Firefighting and get to the root cause
- Learn Lean tools, countermeasures and thinking to eliminate ‘Waste’
- Practice Respect for People & Continuous Improvement

Agenda

- Introduction to Lean
  - *Mr. Potato Head Game Round 1*
- Foundation– Value, Waste
- **Break**
- Intro to Problem Solving, Root Cause Analysis
  - *Mr. Potato Head Game Round 2*
- 5S, Visual Management
- Error Proofing
  - *Mr. Potato Head Game Round 3*
- Process Mapping vs. Value Streams
- Single-piece flow & Balancing Work
- **Lunch (12:00 to 12:30)**
- Standard Work & Exercise
- Cellular Layout, Flow, Pull, A3 Problem Solving
  - *Mr. Potato Head Game Round 4*
- Value Stream Mapping – Large Projects
- Idea Systems
- **Break**
- People Pillar – Culture, Respect, Leadership
- Next Steps

Introduction

- Ground rules

- Introductions. Please discuss at your tables in groups of 2 or 3

  - An opportunity for improvement within your department

“Going Lean in Healthcare”

- Discuss pre-class reading (IHI, 2005)

1. **What is meant by “Lean Thinking” and where can Lean be applied?**
2. **What must leaders do for Lean principles to take root?**
3. **What influences behavior?**
4. **What are some challenges to becoming Lean?**
5. **What’s the best way to ensure a clear vision and understanding?**

What is Lean?

"Lean" is both an approach to work & an organizational philosophy

- A set of methodologies designed to solve organizational problems and improve results.
- Culture of continuous improvement, and people development.

Lean ≠ Mean

Or downsizing, or outsourcing, or working faster … or just common sense

Why Lean?

Quality

Satisfaction

- Reduces customer wait times
- Reduces errors
- Standardizes workflow
- Reduces unnecessary workload, duplicative work and/or rework
- Improves hand-offs
- Increases productivity
- Reduces inventory

Efficiency

"At Toyota we get brilliant results from average people managing a brilliant process.

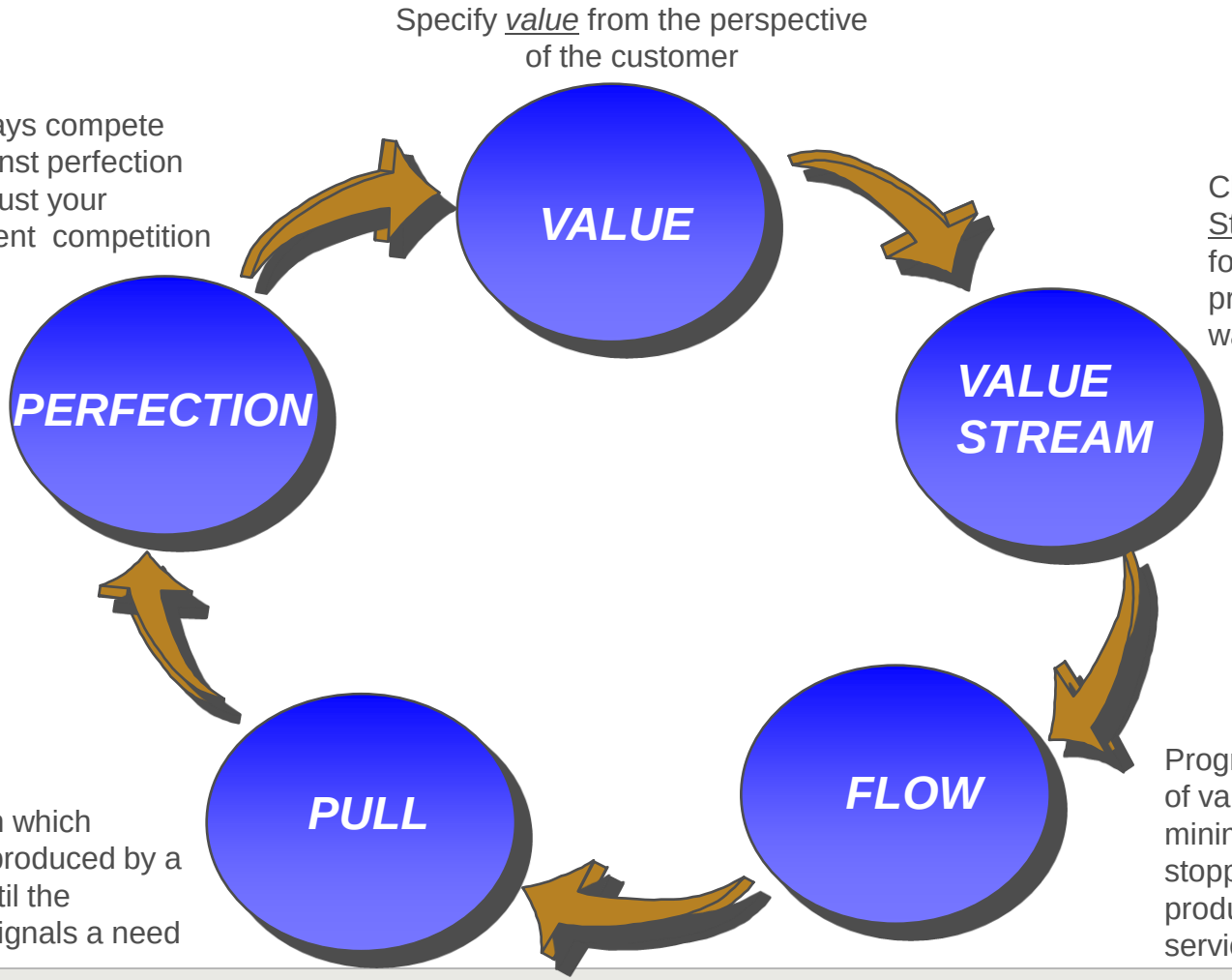
Others get average results from brilliant people managing broken processes."
--The Toyota Motor Company

People are not the cause of problems, bad processes are.

Discussion

- How might Lean fit with organizational initiatives at HMS?
- Think, pair, share – 1 min, 5mins, 10mins

5 Guiding Principles of Lean



Where did Lean come from?

And how did we get from automobiles to all industries?

Where did "Lean" come from?

1920s - 30s

1940s

Time & Motion
F. Taylor

Interchang-able Parts
E. Whitney

Mass production
…World War II

American Supermarkets (A&P)

"Just in time"

Industries:
- Manufacturing
- Services
- Retail
- Healthcare
- Others

90s - present

"Lean"
J. Womack
1980s – 90s

Toyota Production System (TPS)
1940s

Exercise

- Mr. Potato Head Game

Mr. Potato Head - The Plan-Do-Study-Act **Game**

- Your team is the DNA Sequencing Research Team
- The goal of the game is to accurately assemble as many Potato Heads (mini genomes) as possible in 4 minutes
- Explain the metrics

Game Rules

- **Only 2 people** from each team can put the Potato Head body parts on the Potato Head
- **All other team members** will give the correct pieces to the “Assemblers”
- **One person on the team** will be the “Inspector” and check
  - **Does the Potato Head match the picture?**
  - How many Mr. Potato Heads are completed?

ASSEMBLE YOUR TEAMS

- Choose your 2 “Assemblers”
- Choose your Inspector
- When we start:
  - Open the bag, find the photos, fix your “genomes”

- When we end:
  - Inspect your “genomes”

4 Minutes!

- http://www.online-stopwatch.com/full-screen-stopwatch/

- Why did we pick 4 minutes?
  - If it takes 20-30 seconds to correctly assemble one Potato Head with no waste in the system, it should take maximum of 5 minutes to assemble all 9 if only 1 assembler. You have an entire team!

- Guinness Book of World Records' fastest assembly of a Mr. Potato Head: Samet Durmaz of Turkey.

6.62 seconds!

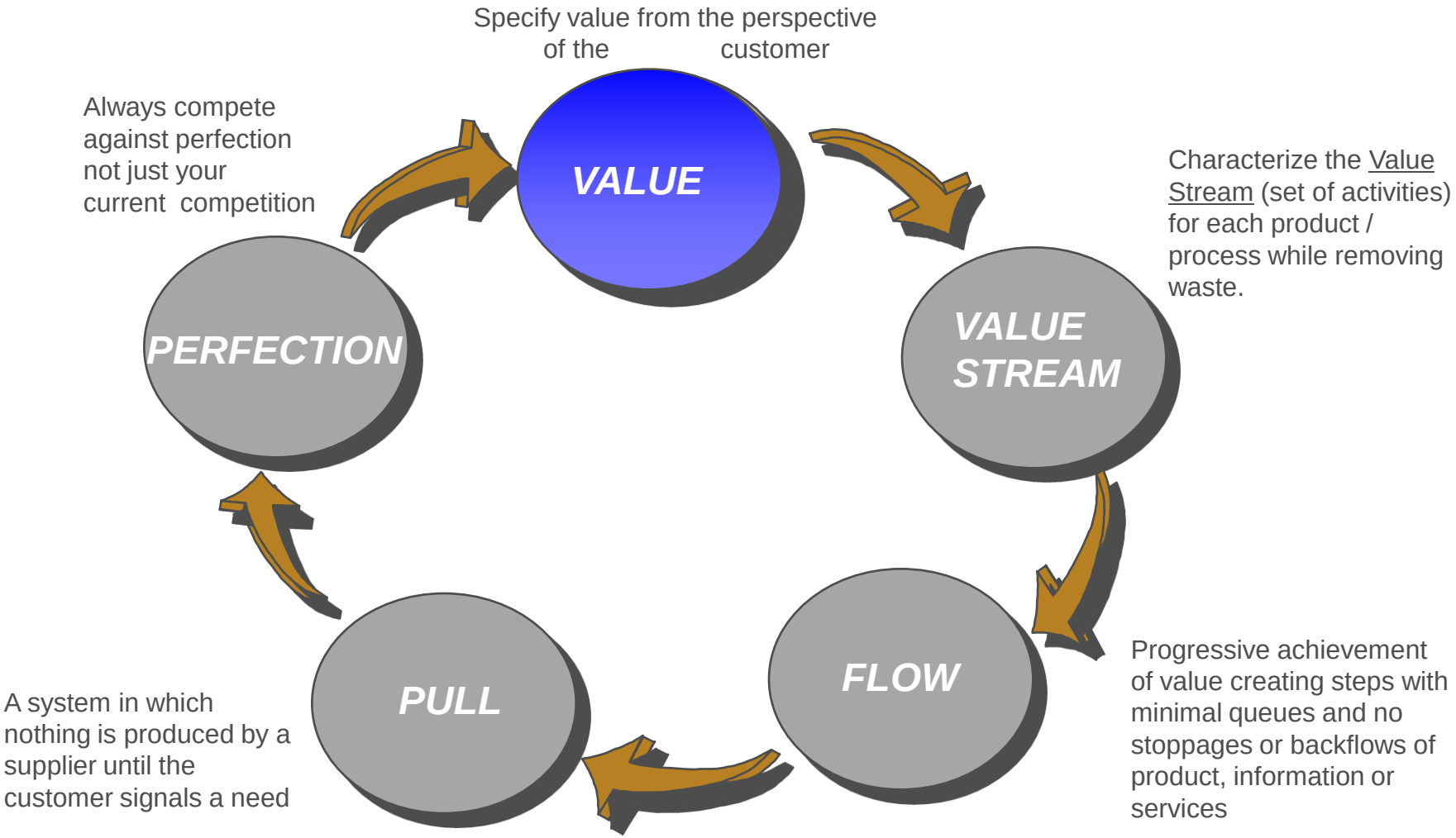
Metrics Scorecard

	Round 1	Round 2	Round 3	Round 4
# Complete				
# Errors				
# Correct				

Mr. Potato Head - Debrief

- Total Complete, # Errors, # Correct
- What did you notice?
- **Why**?
- What will you try next time? **Why?**

5 Guiding Principles of Lean



Types of Work

Value-Added Work

Activities that transform material , information, or people into something that the customer cares about ($)

- Orientation, approving travel

Increase

Required Non-Value

No value in the customer's eyes, but can't be avoided

- Debarment form, Regulatory tasks

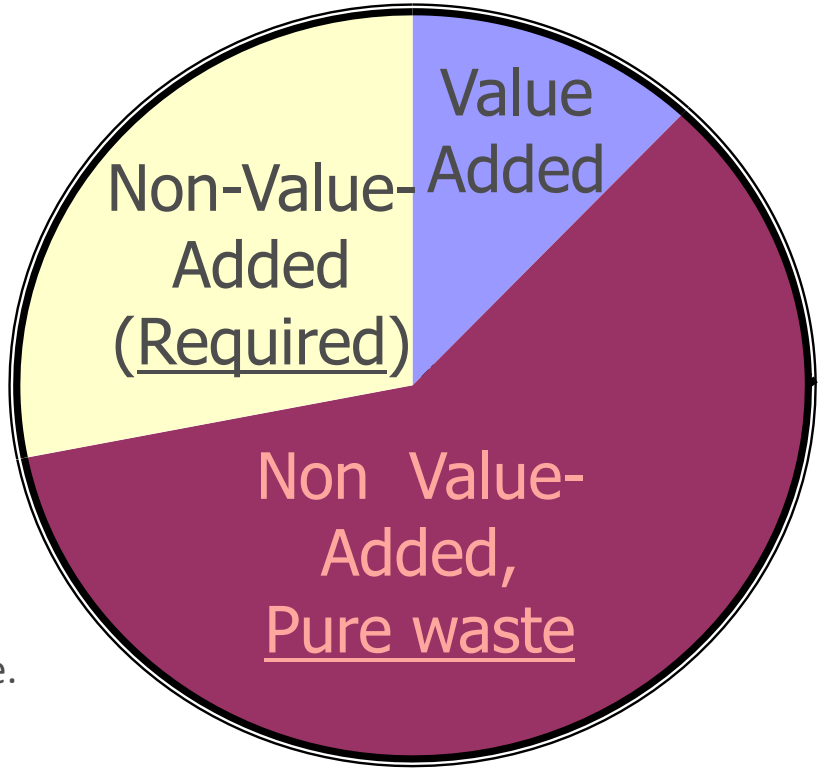
Minimize

Pure waste –Non Value

Consumes resources but doesn't add value.

- Looking for data/information
- Staff waiting
- Re-work, redundant paperwork

Eliminate



Pizza – What are you willing to pay for?

Waste =
Non-Value-Added =
Not Willing to Pay For
($$)

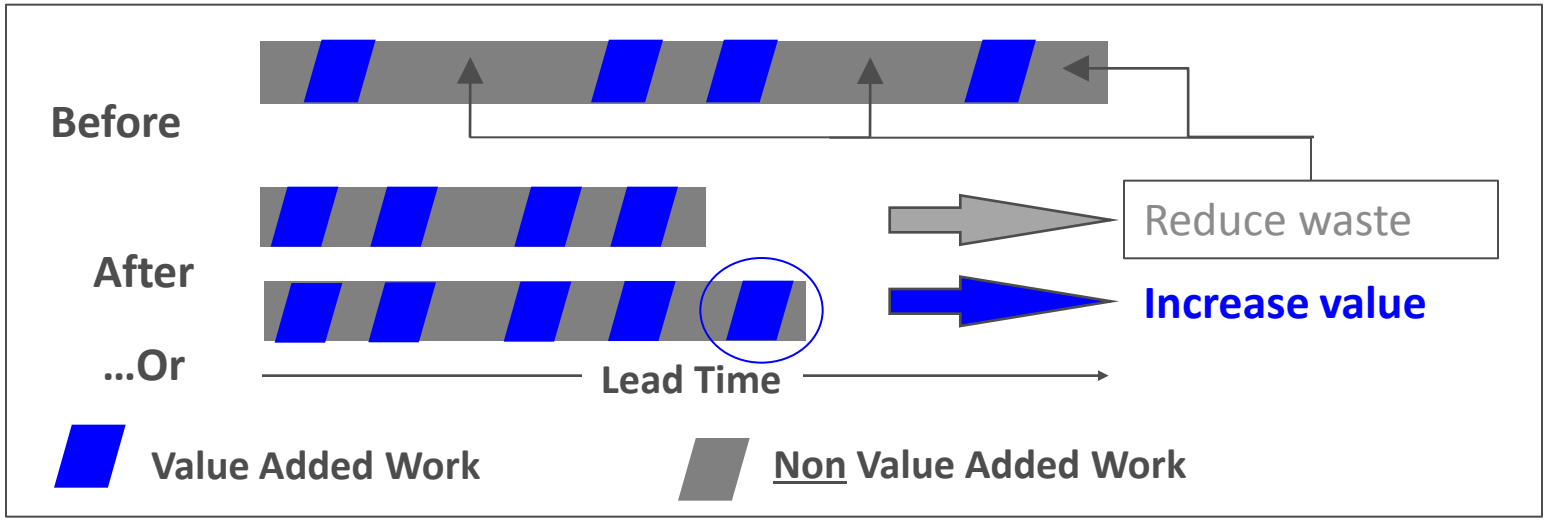
Yes	No	
		Dough
		Sauce
		Toppings
		Toppings drop on the floor
		Energy for ovens
		Energy for ovens left on over night
		Labor for the delivery person
		Travel expenses for delivery
		Daily car washes for delivery person's car
		Long distance phone charges to the cooks bookie

Eliminate Waste – Increase Value

Observe that 2 Things are ALWAYS Happening. . .

1. Things that **should be** done → **Value**
2. Things that should not be done → **Non-Value**

Example



"It"...Either Adds Value or Does Not

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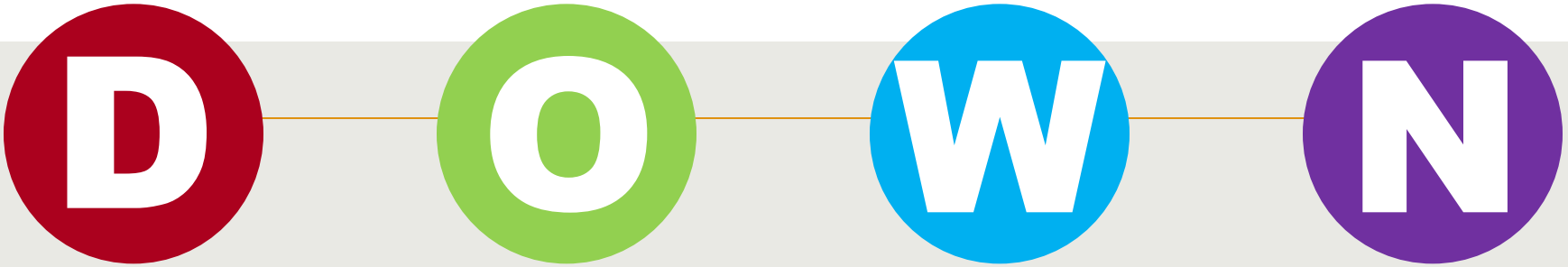
The "8 Wastes"



Defects

Errors
Wrong coding on requisitions, Incomplete/incorrect info. for Grants submission

Overproduction

Doing more than needed
Extra reports, Unnecessary info. sent automatically, printing in advance

Waiting

Waiting or Delays
Waiting for information, report, answer, approvals, signatures, etc.

Not Utilizing Employees

Ideas and skills not used
Not recognizing employees as best source for fixing issues

Transport

Movement of people or material
Transport between campuses, hand delivering invoices to A/P, Movement of files to different locations

Inventory

Too much material
Buying in bulk, stocking toner when we get next day delivery, more servers than required, supplies, equipment

Motion

Movement by workers
Searching for supplies, items needed not close by, always looking in shared drives

Extra Processing

Re-dos
Unnecessary approvals, rework, same data required in multiple places or systems

"Eyes for Waste"

Waste Walk Form

Waste Walks	Department: Names of department or people	Date of Waste Walk : date	
For a process in your area , identify where waste may exist and think of one or more ways to reduce or eliminate them. Attendees should include a lean expert, frontline staff and supervisor			
Type of Waste	**Specific Waste**	**5 Whys** (use Fishbone template if needed)	**Ways to Reduce** (e.g. 5S, error proofing, visual controls)
Defects	1 2		
Over-Production	1 2	Not yet	Not yet
Waiting	1 2		
Not Utilizing Employees	1 2		
Transportation	1 2		
Inventory	1 2		
Motion	1 2		
Extra Processing	1 2		

Supervisor Approval for Countermeasures: _____

HARVARD MEDICAL SCHOOL

LEAN Community Date: _____

Waste Walk *Video*

- Use the Waste Walk form on the next page and in your handout to identify waste you find in the following video.
- On the Waste Walk form, list the waste by category (e.g. Waiting, Transport / Motion, Inventory, Defects, etc.)
- We'll discuss your findings after the video.

Exercise

Think, Pair, Share

- *Identify 3 examples of Waste – 1min*
- *Share with those next to you – 2min*

Gemba…

- …At the site
- …Where the work is happening
- …The office area
- …The lab workbench

Muda, Mura, Muri

- Muda – Activity or process that does not add value (8 wastes)
- Mura – Unevenness or inconsistency
- Muri – Overburden, unneccesary stress to employee and processes

"Without standards there can be no *Kaizen*."

-Taiichi Ohno

Break

Back in

10 minutes

The Toyota Way

True North

Best Quality – Low Cost – Shortest Lead Time
Best Safety – Highest Morale

Continuous Improvement

Respect for People

PDSA Learning Cycles

Lean *House* Model:

System Goal

Just in Time

Produce only what is needed, when it is needed

- **Continuous Flow (Cells, Balance)**
- **Pull Systems (WIP Limits)**
- **Quick Setups**
- **Total Productive Maintenance**

*People

Culture

Flexible, Highly Motivated People

Built in Quality

- **Error Proofing**
- Jidoka
- **Visual Management**
- SPC & 6σ
- Design for Assembly & Mfg

Never pass defects to next Process

Stop the Line! (Andon)

***Foundation* of Operational Stability**

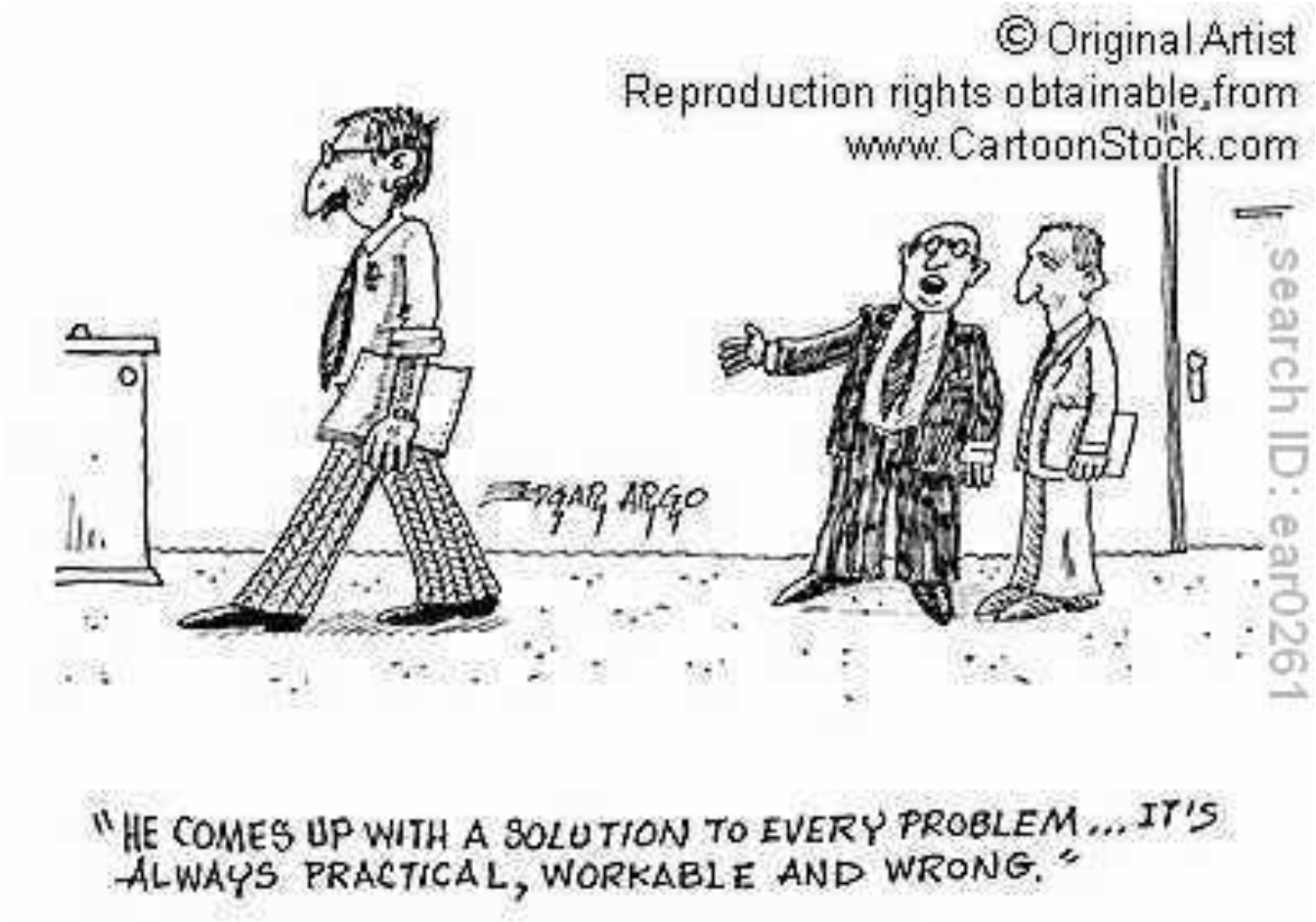
Value Stream Mapping
Waste Elimination

Problem Solving
5S & Visual Management

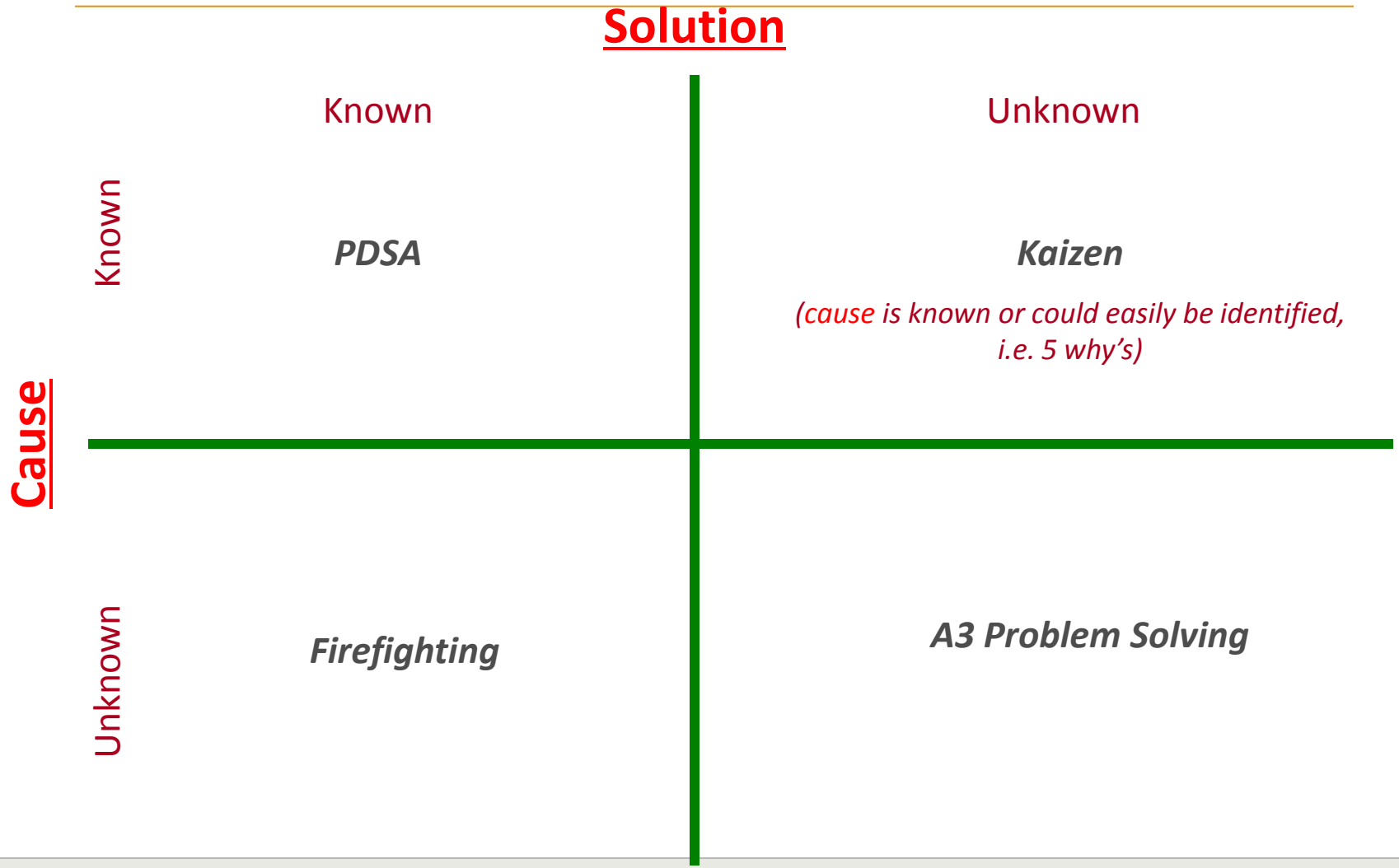
Metrics
Standard Work

Adapted by UMMHC from J. Liker, 2002 and Altarum

Introduction to Problem Solving



Multiple Problem Solving Methods



What does “Kaizen” mean?

- “… a system of continuous improvement in quality, technology, processes, company culture, productivity, safety and leadership that involves every employee and the identification and elimination of waste.”
- Literal Translation: “to become good through change”
- It is a Daily Process of improving at the front line
- In a kaizen “event”, we know the problems and root causes, but are not sure yet of the best countermeasures. We figure that out, and implement by the end of the event.

The Kaizen "Event"

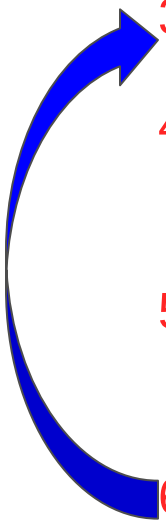
- Can be 1-4 hours,1-2 days, at most 5 days

Lean Problem Solving

1. Define the problem clearly. Scope.
2. Understand the problem, deeply. *Go see.*
3. Find the *root cause(s).*
4. Only then, design countermeasures, and implement.

I don't have time…

5. Track analyze your results. Measure before and after.
6. Try again, until goal is achieved.



Is there a Root Cause to Waste?

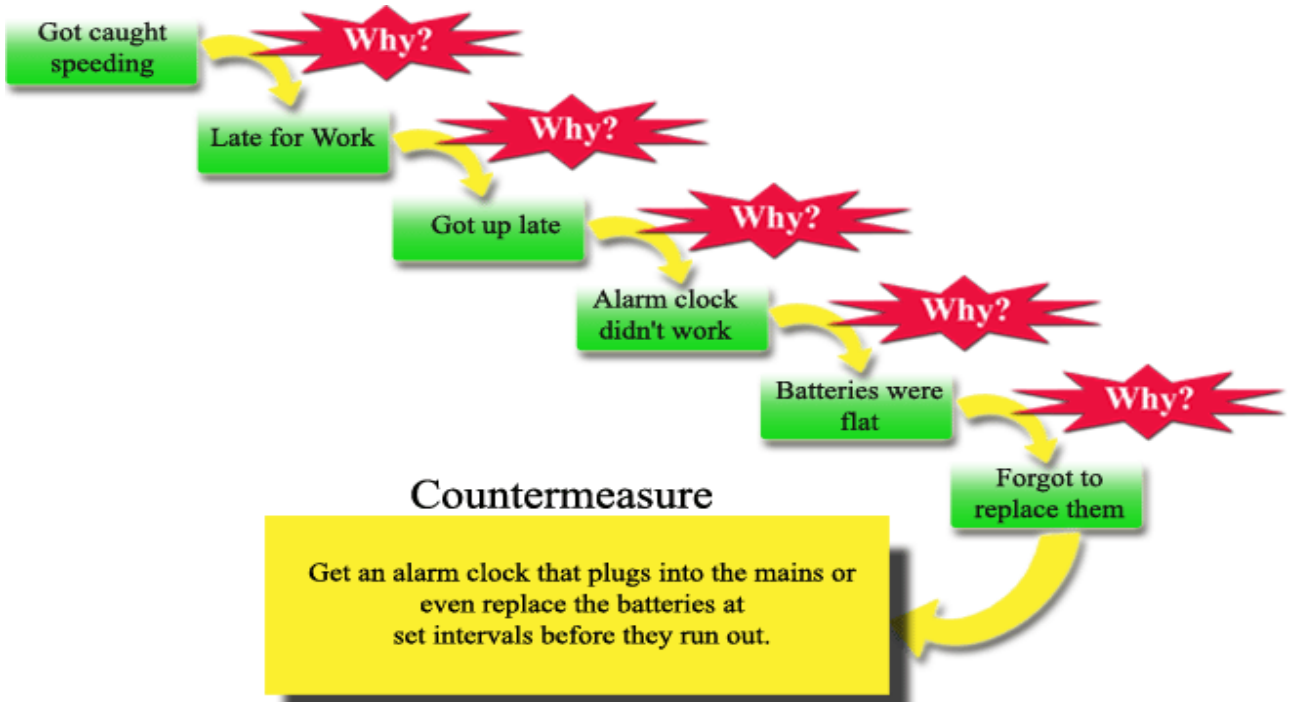
- What is meant by "root cause"?
  - Underlying reason, usually not obvious. The "real" problem.
  - Vs. "contributing" cause, or symptoms.

- Why do we pursue the root cause?
  - Root cause is solvable and will result in fixing the problem by applying a countermeasure
  - Solving contributing causes or symptoms won't eliminate the problem (the Waste).

- Root Cause Analysis Tool – **5 Why's**
  - Breaks down each reason or cause until further breakdown is not possible

How to Find the Root Cause?

- What is the **real** problem? What is the root cause?
  - Ask why 5 times
  - Purpose – to discover the root cause



“5 Whys” Example

BASED ON A TRUE STORY

How many of you have been to Washington, DC?

How many of you have visited the Jefferson Memorial?

……

Please play along….

A few years ago the National Park Service recognized that the marble on the Jefferson Memorial was deteriorating faster than the other memorials.

Audience…. “**Why???**”

It was from all the power washing they had to do… more than on the other monuments.

Audience….“Why so much power washing???”

“5 Whys” Example

Because of all the bird droppings

Audience ….“Why so many bird droppings???”

The birds were being attracted to eat all the spiders…

Audience ….“Why so many spiders???”

There were so many spiders, because they were attracted to the little black insects.

Audience ….“Why so many tiny black insects???”

“5 Whys” Example

The little insects were attracted by the lights….

Finally….an <u>actionable</u> cause….

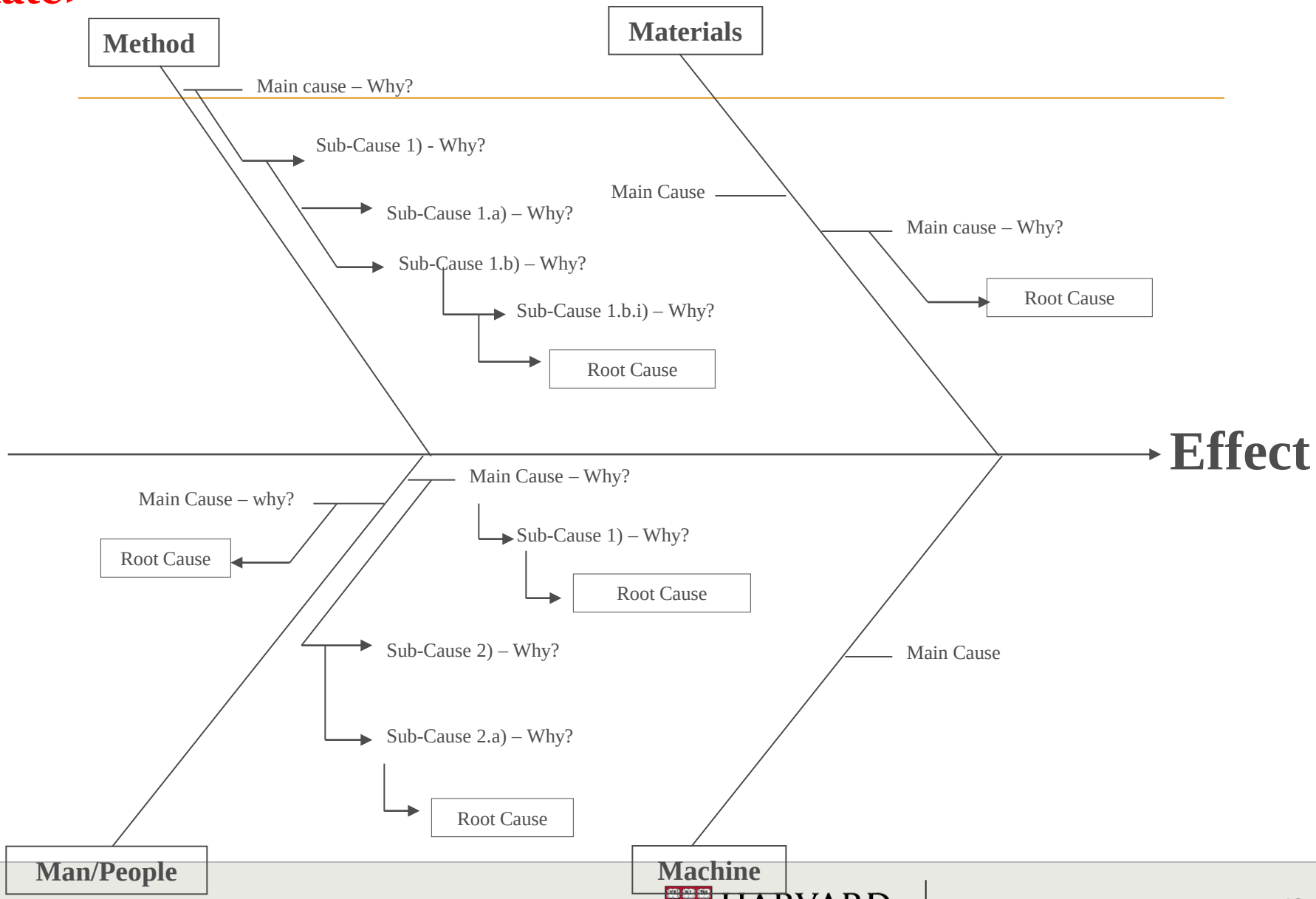
In fact, they found that **for no good reason**, the lights at this memorial were on several hours longer than at other memorials.

The park service reduced the time of the lights, the problem got better, and over $200,000 was saved on maintenance expenses.

Fishbone Diagram

Date:

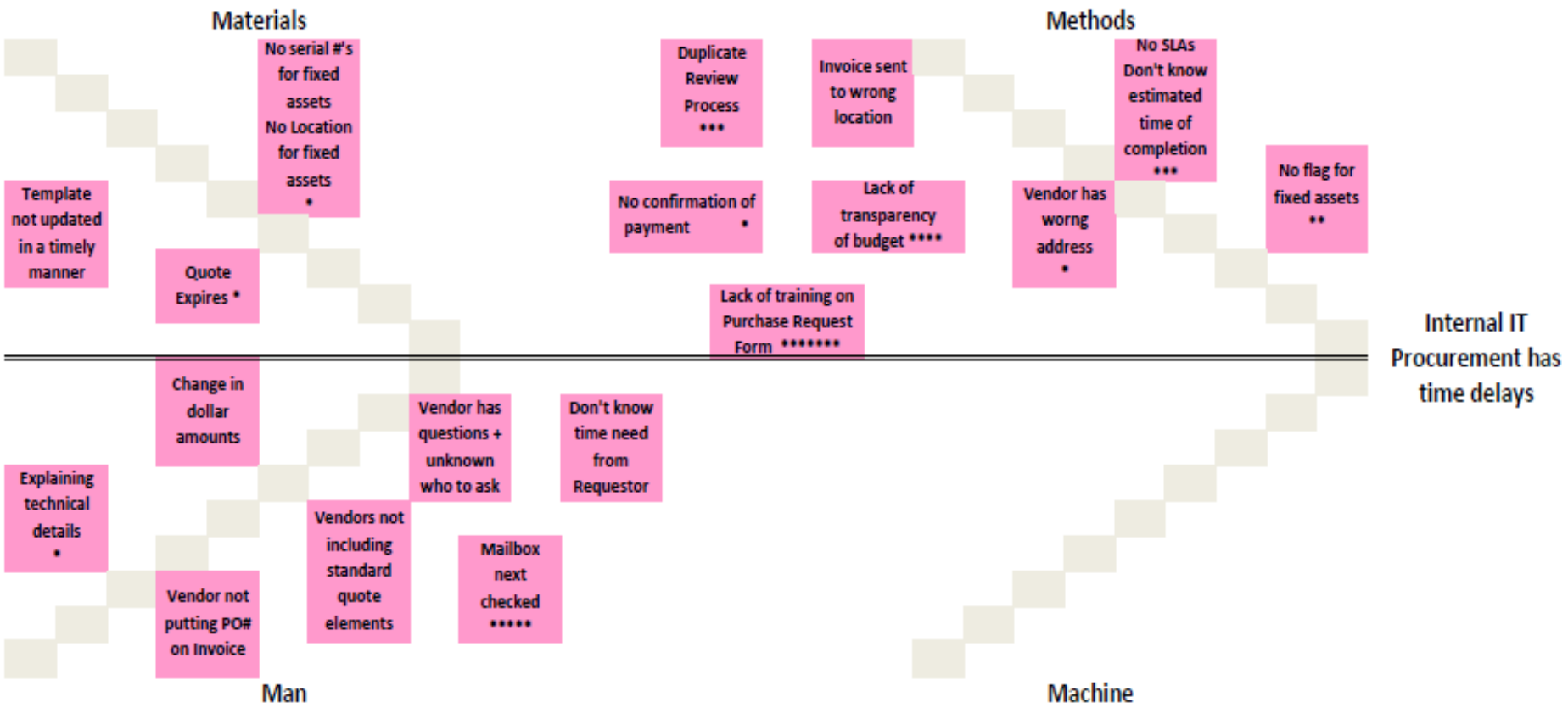
<date>



PROBLEM STATEMENT:

IT Purchase requests are taking more than 7 business days to process and approve. Requests are submitted without the appropriate information resulting in approval delays.

Fishbone Diagram



* = 3 or More Votes
= 2 or Less Votes

Exercise

- Now it's your turn

- Pick one identified waste from the Mr. Potato Head Game and do a root cause analysis using 5 whys

Mr. Potato Head - The Plan-Do-Study-Act **Game**

- Round 2
- Same rules
- Switch bags!

4 Minutes!

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	2		
Over-Production	1		
	2		
Waiting	1		
	2		
Not Utilizing Employees	1		
	2		
Transportation	1		
	2		
Inventory	1		
	2		
Motion	1		
	2		
Extra Processing	1		
	2		

Not yet

Supervisor Approval for Countermeasures: _____ Date: _____

Countermeasures

Visual Management

- Make operations visually obvious
- Make problems stand out – make it easy to identify error conditions

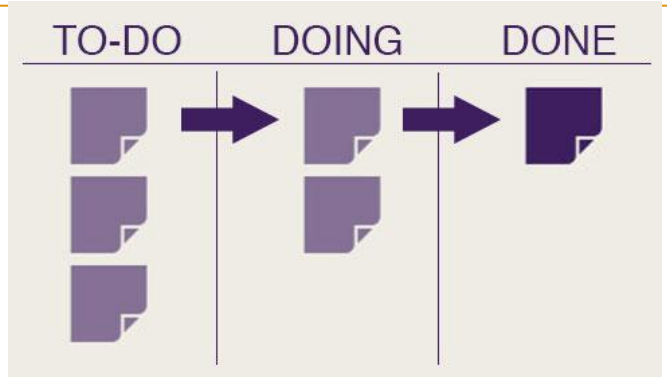
Visual Workplace:

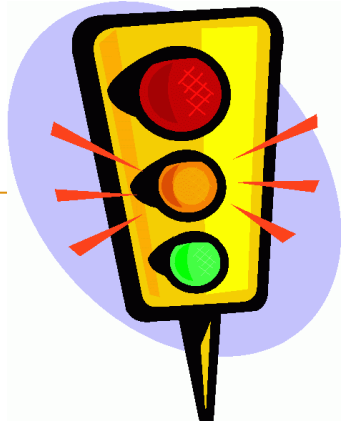
When anyone can walk into a workplace and visually understand the current situation.

Areas to use Visual Management?

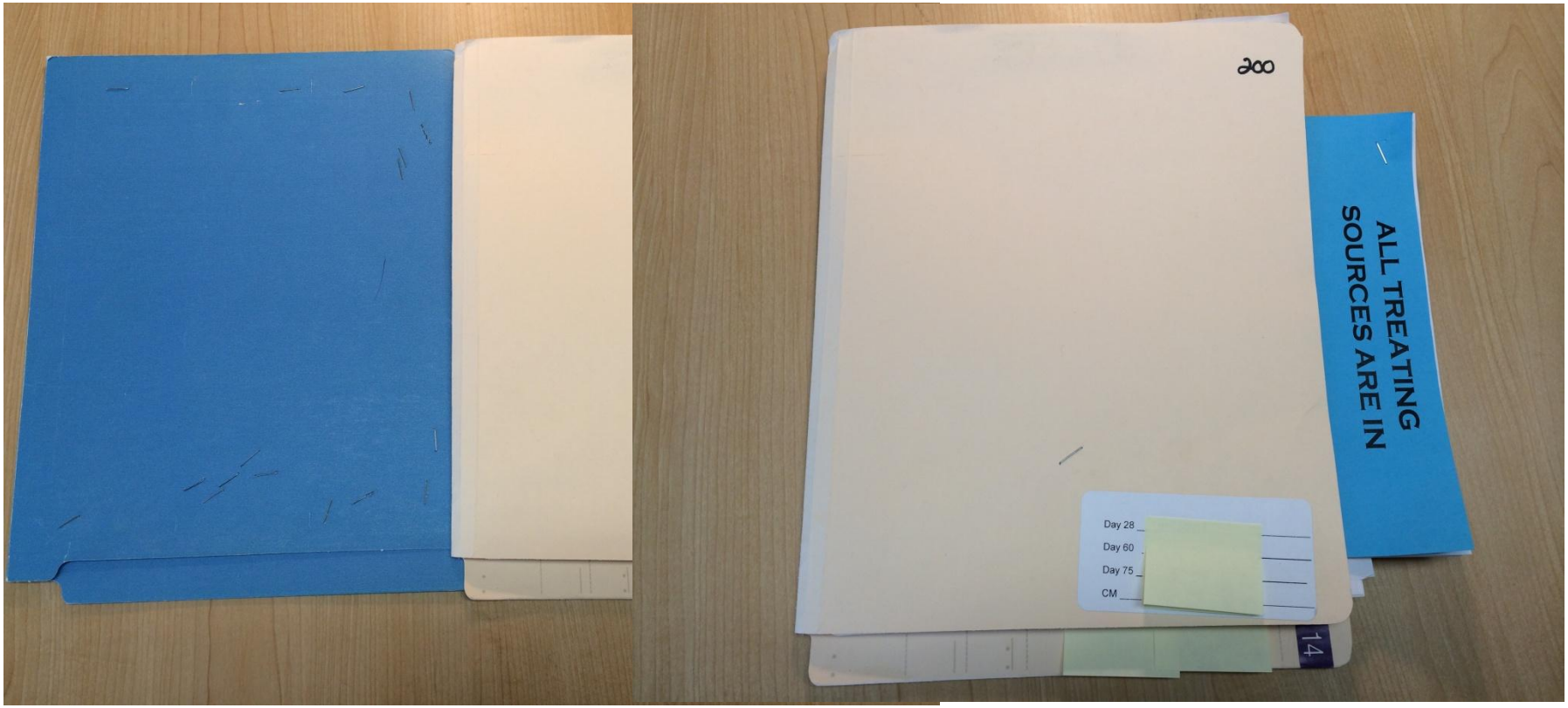
- Color Coding
- Sign Boards
- Standard Work
- Performance information - tracking against key metrics
- Status of current issues and improvement activities

Visual Management - Examples

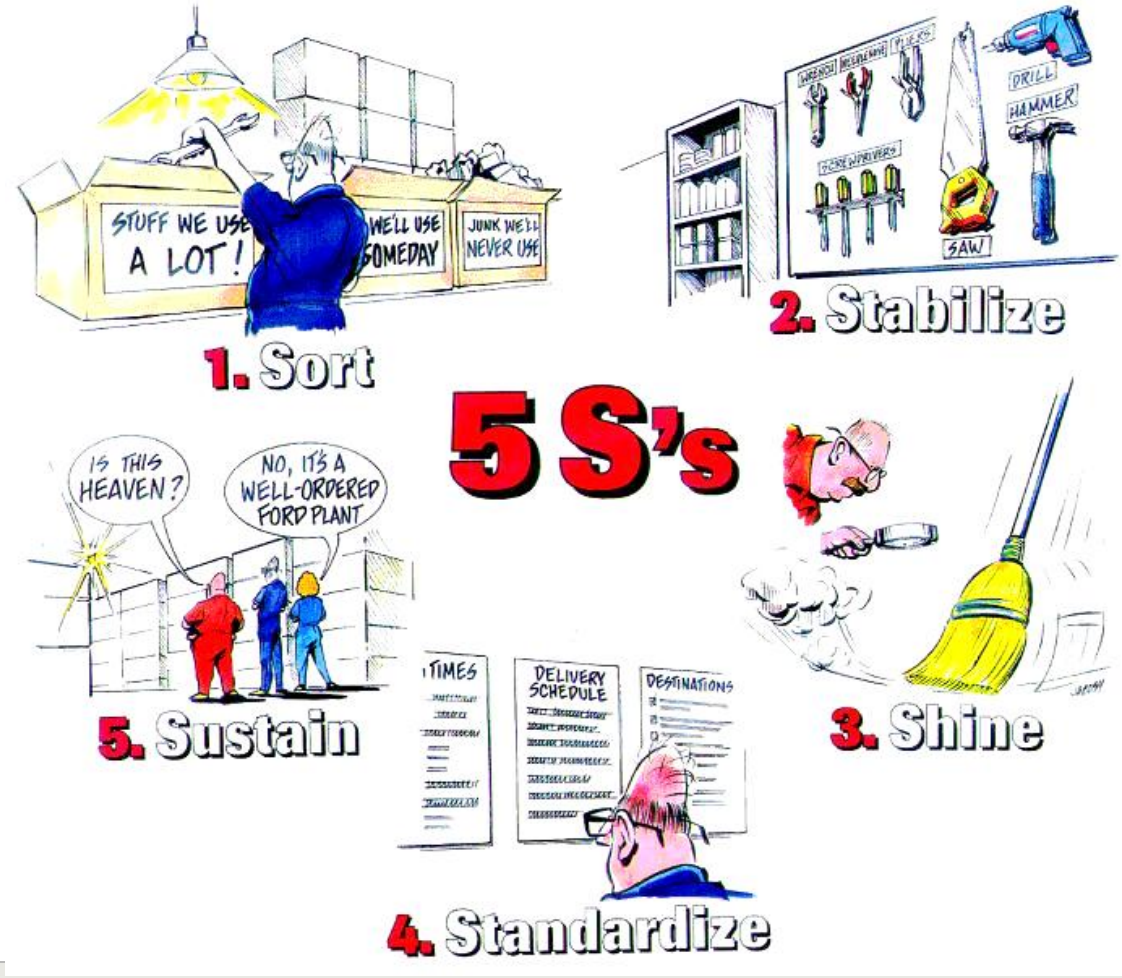




Visual Management Examples - DES



5S


STUFF WE USE A LOT!
WE'LL USE SOMEDAY
JUNK WE'LL NEVER USE
1. Sort
DRILL
HAMMER
SAW
2. Stabilize
5 S's
IS THIS HEAVEN?
NO, IT'S A WELL-ORDERED FORD PLANT
5. Sustain
3. Shine
TIMES
DELIVERY SCHEDULE
DESTINATIONS
4. Standardize

5S: Do you see any Waste?

Where to use 5S

- Supply closets, file cabinets, equipment rooms where many different people need to be able to quickly find important supplies
- Desks, or other shared workspaces where more than one person uses the space and a standard layout will help
- Impact – less waste each time someone needs to look for a supply item; significant inventory reductions

#1 Sort & Scrap

- Remove everything from the selected area (optional)
- Sort and categorize items based on usage frequency
  - **Hourly** should be within arms reach
  - **Daily** - within a short walking distance
  - **Monthly** - departmental storage
  - **Annually** - central storage area
- Include signs, notices, post-its on walls.
- List everything that needs repair, and arrange for fixes
- Red tag and remove unnecessary items

#1 Sort & Scrap

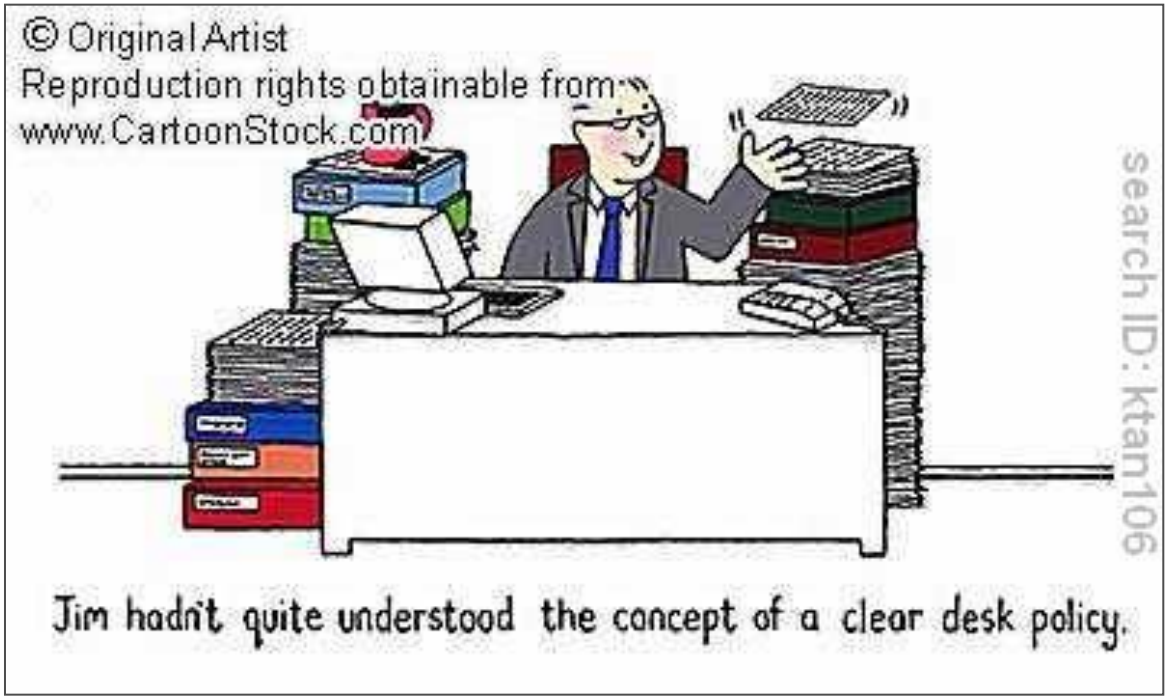
"The Bosmans' wedding announcement? Stick it on the fridge so we don't forget about it."

… leaving only the things needed and ready for the job at hand.

#2 Stabilize & Straighten

Have a place for everything and everything in its place

- Arrange items in a manner that promotes work flow
- Use labels and color codes
- Create checklists, pictures, etc. to verify what should be there
- Use aisle markings, placement for equipment
- Keep personal items to a minimum



- Organize items according to Sequence of Use (SOU), Frequence of Use (FOU), or Point of Use (POU)

#3 Sweep, Scrub, Shine

- Create and maintain a clean, functional space to work.
- Keep equipment clean and maintained.
- Deal with causes of filth, grime, and equipment disrepair
- Clean and orderly begets clean and orderly … messy and clutter encourages more mess and clutter
- Divide area into zones and assign individual responsibilities.
- Include improving lighting on your list!

5S Follow Straighten with Sweep, Scrub

Before

After

#4 Standardize

- Make 5S activities routine to **make abnormal conditions obvious**
- Create procedures and checklists to maintain. Should be visible.
- Assign responsibilities to team members.
- Make part of your **daily** work, not an occasional activity initiated when things get too messy
- Grade areas on how well team members are doing

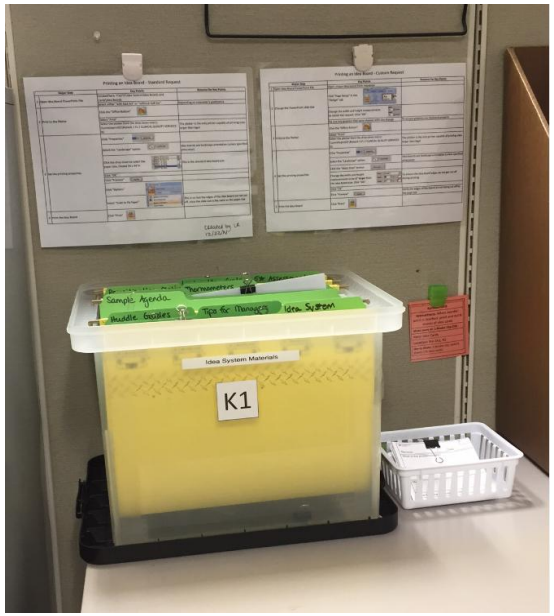
#4 Standardize

- Make 5S activities routine to **make abnormal conditions obvious**

#5 Sustain – *Make it stick!*

- Commit to the 4 previous steps and continually improve on them
- Determine inspection methods, frequency
- Establish and perform evaluations of each step
- Use auditing to insure continued vigilance
- Measure the impact, and make sure everyone knows

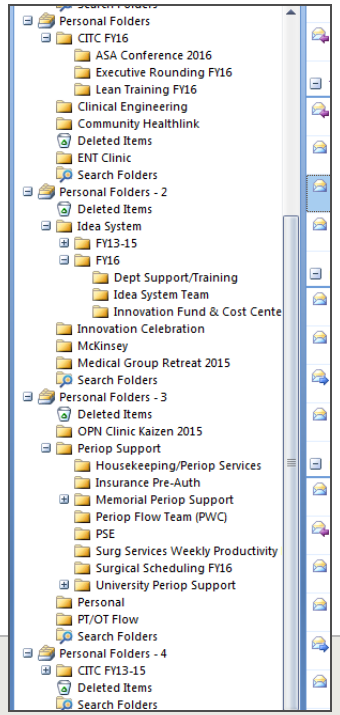
5S - *In Action*



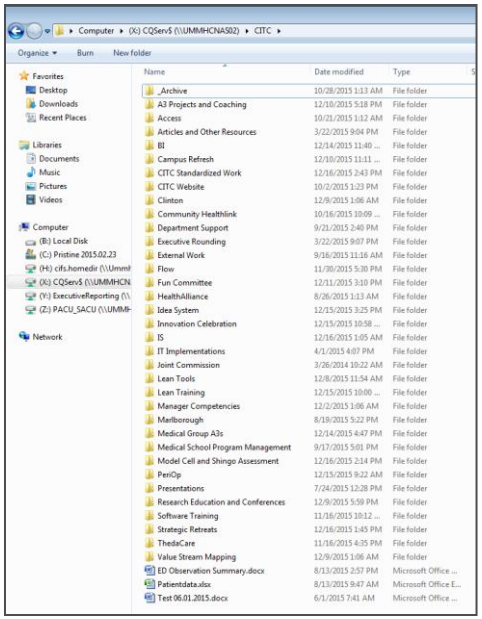
CITC Supply Room - After

5S - *In Action: Electronic 5S*

Outlook Calendar: Create color standards so you know what you're working on at a glance!



Outlook E-mail: Create "rules" to help prioritize new e-mails, and sort messages into folders so you can find what you need when you need it



Shared Drives: 5S your team's shared drive to quickly find files and team information

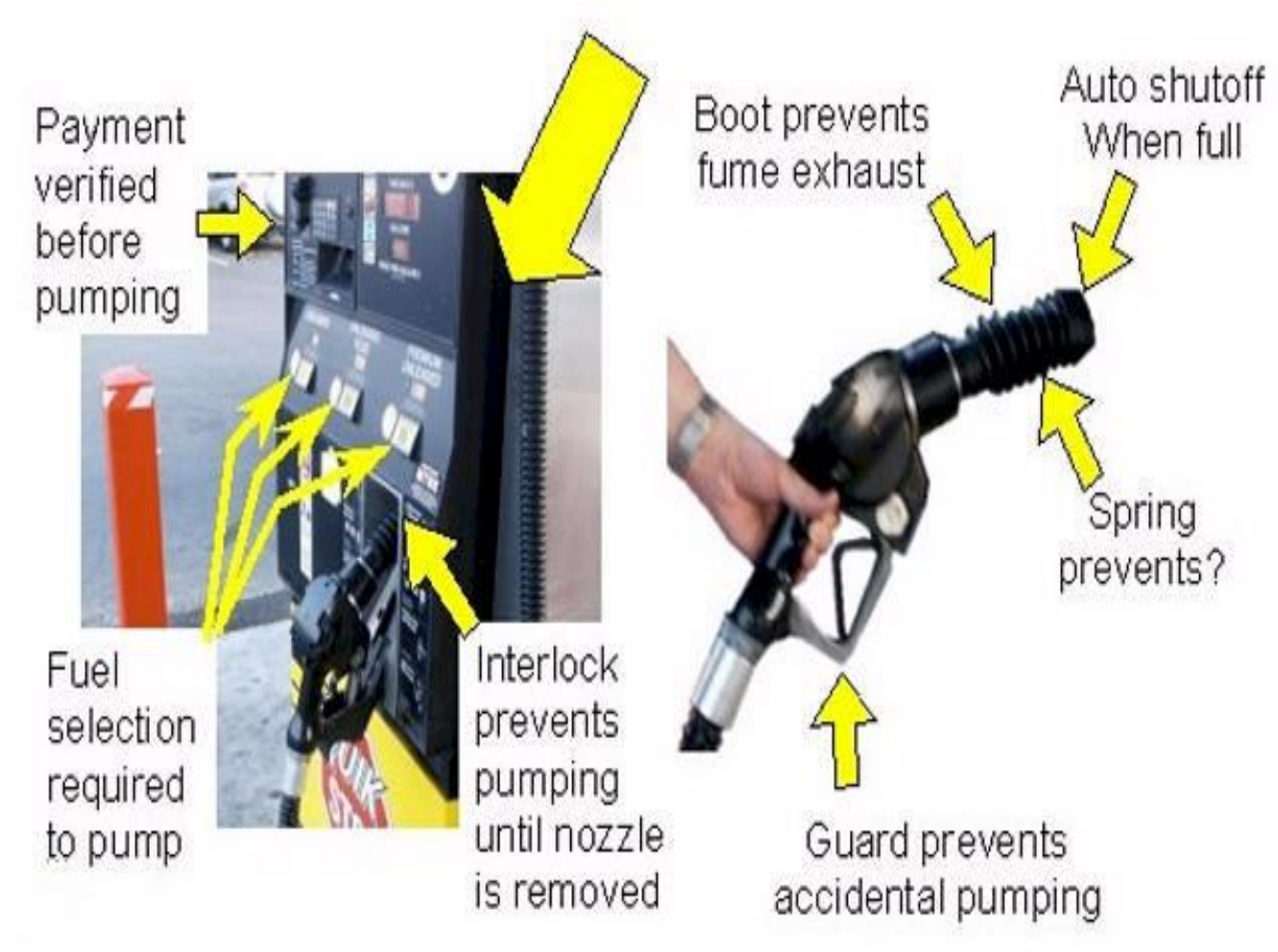
Error Proofing – Poka Yoke

“Poka” - inadvertent errors
“Yokeru” - to avoid

- The way to avoid inadvertent errors is by Error or Mistake Proofing.
  - Level 1 – The error is impossible to repeat
  - Level 2 – Make the error obvious

Expectations: Big Improvements in Quality!

Level 1: Total Prevention - Defect cannot be made



www.assuredquality.com/fuelpump.htm

Level 2 Prevention: Greatly Reduced

Defects prevented by making them visually obvious

LOS ANGELES, California (AP) -- The newborn twins of Dennis Quaid and his wife, Kimberly, were reportedly given an accidental overdose of blood thinner at a hospital.

Dennis Quaid and his wife, Kimberly Buffington, arrive at an April, 2006, movie premiere.

The celebrity Web site TMZ.com said the actor's children, Thomas Boone and Zoe Grace, were given vials of heparin, used to prevent clotting, that were 1,000 times stronger than what was prescribed. Citing unidentified sources, the site said the children were in Cedars-Sinai Medical Center's neonatal intensive care unit.

The hospital apologized Tuesday to the families of three patients involved, but said it could not release the names because of confidentiality laws. It said tests indicated that there were no adverse effects on the patients.

OLD

Report: Dennis Quaid's Twins get accidental overdose

Suanne Buggy, a state Department of Public Health spokeswoman, said the agency is investigating reports of an incident involving newborn twins at the hospital. She did not elaborate.

Watch Dr. Sanjay Gupta explain the heparin danger »

Cedars-Sinai's chief medical officer, Michael L. Langberg, said in a statement that on Sunday three patients each received vials containing 10,000 units per milliliter of heparin instead of vials with a concentration of 10 units per milliliter.

Once the hospital staff realized the "preventable error," they did tests to measure the patients' blood clotting function, Langberg said Tuesday. One patient's test was normal, but two patients required a drug that reverses the effects of heparin, he said.

NEW

CNN, November 21, 2007

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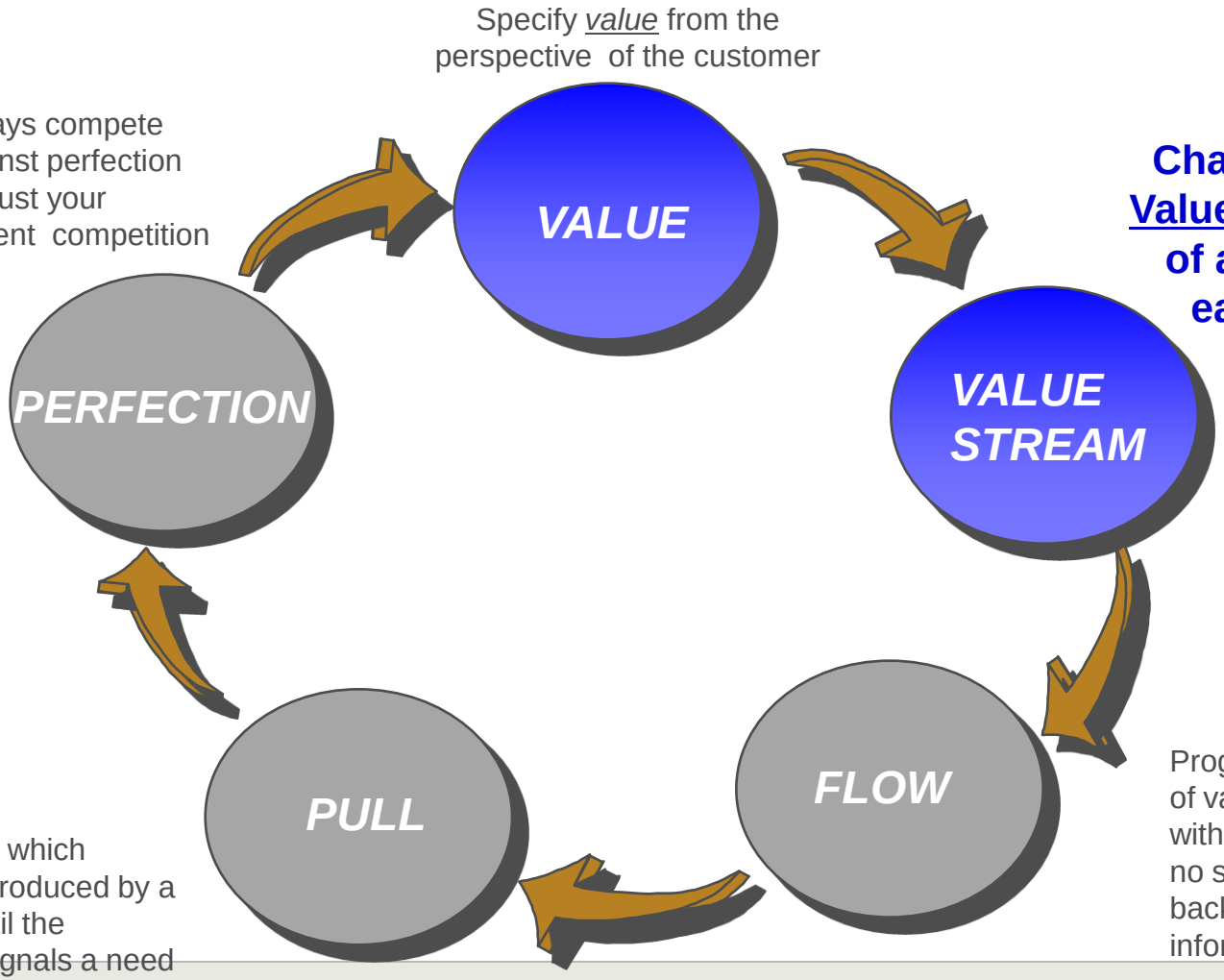
	Round 1	Round 2	Round 3	Round 4
# Complete				
# Errors				
# Correct				

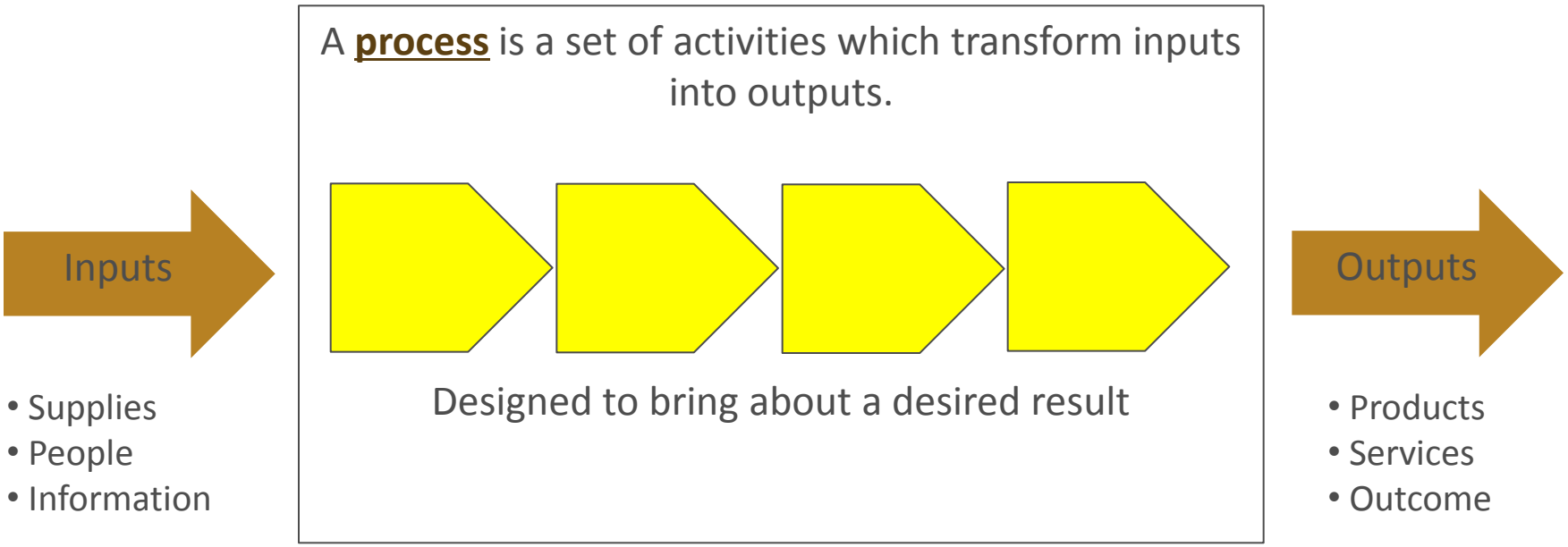
Mr. Potato Head - Debrief

- Total Complete, # Correct, # Errors
- What did you notice?
- **Why**?
- What will you try next time? **Why?**

5 Guiding Principles of Lean

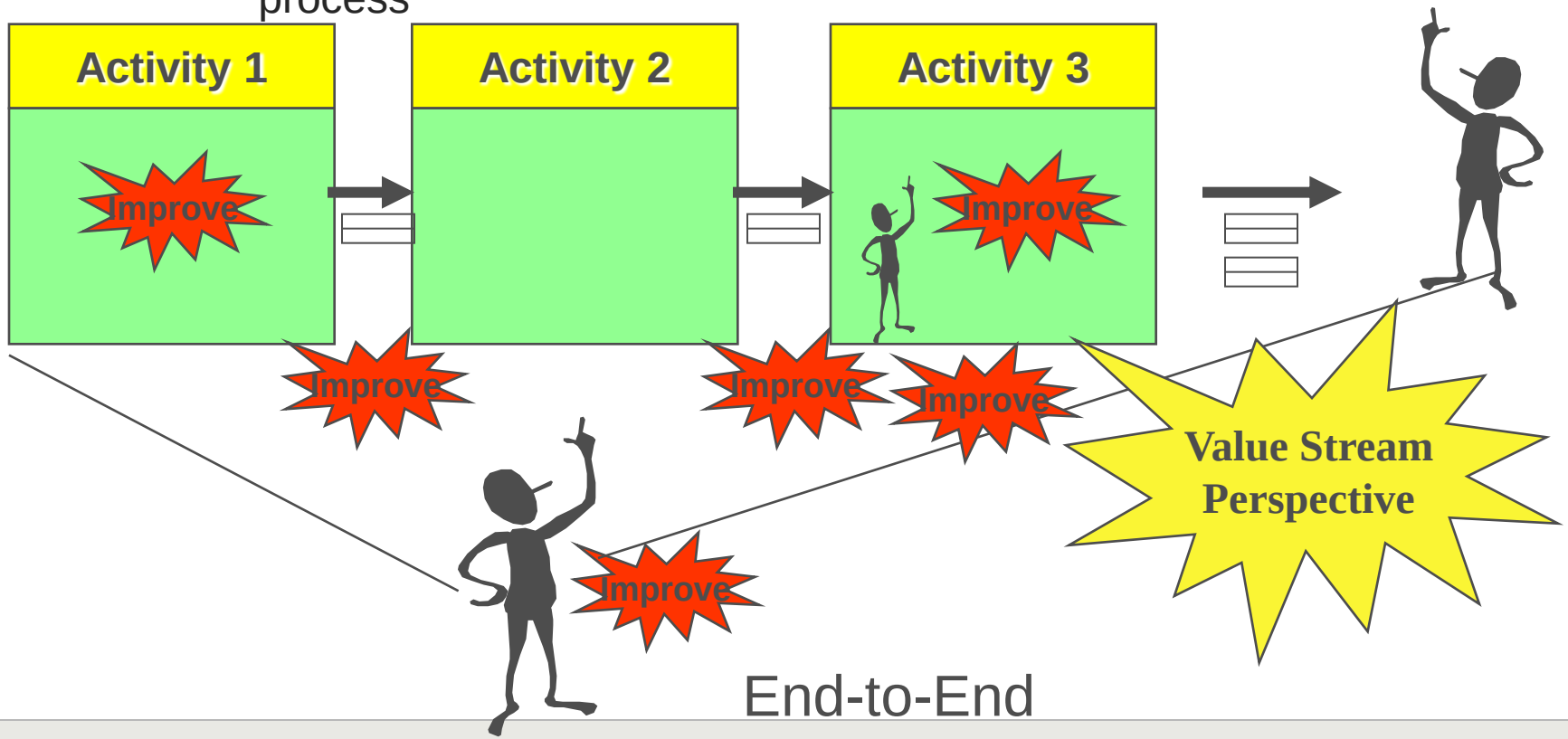


What is a Process?

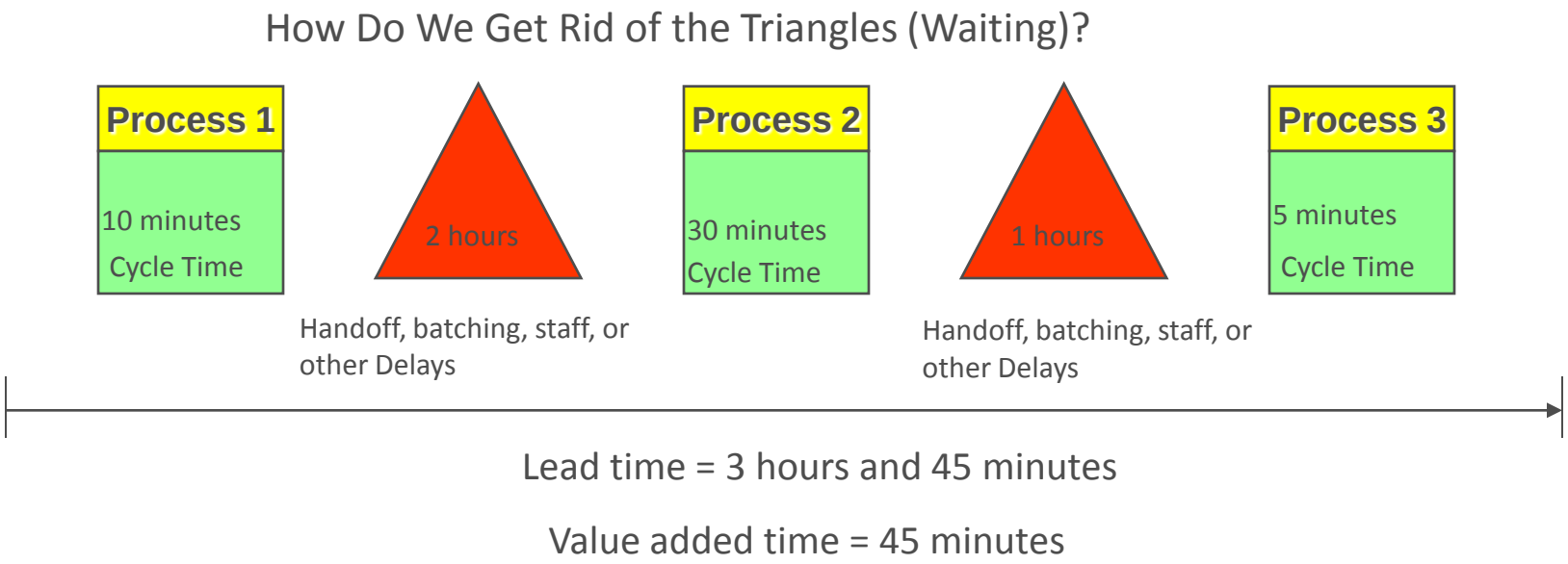


Value Streams

- **Processes** with both **value** and **waste** identified **--** Identify the Steps in the tear game that lead to a “quality” Chart.
- What gets in the way? -- **<u>Identify the problems</u> (Waste)** in the process

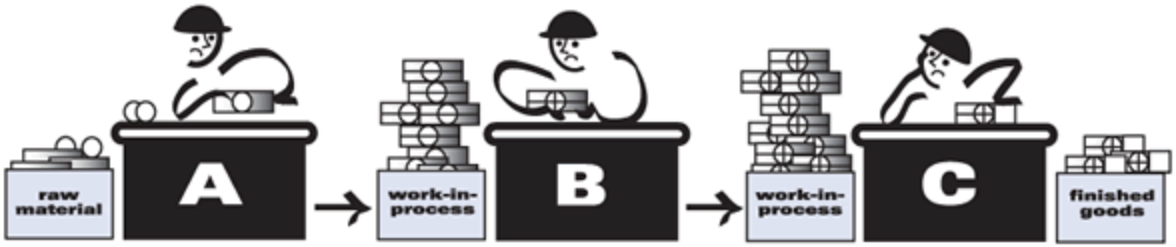


Keep it Moving



- Lead time is the time between the initiation and completion of an order, request, production.
- From the point of view of the product (contract, approval, work order, customer) going through the process. It includes both process times and wait times.
- Examples?

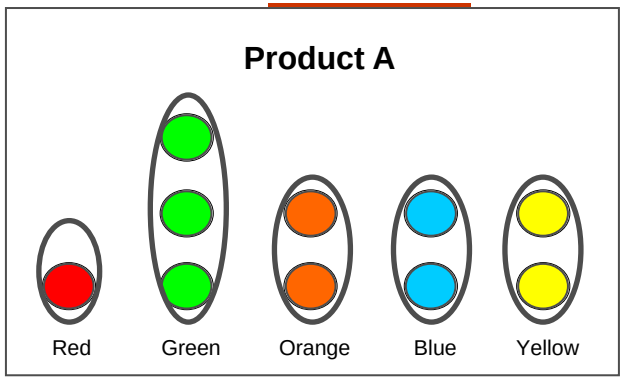
Single Piece Flow vs. Batching

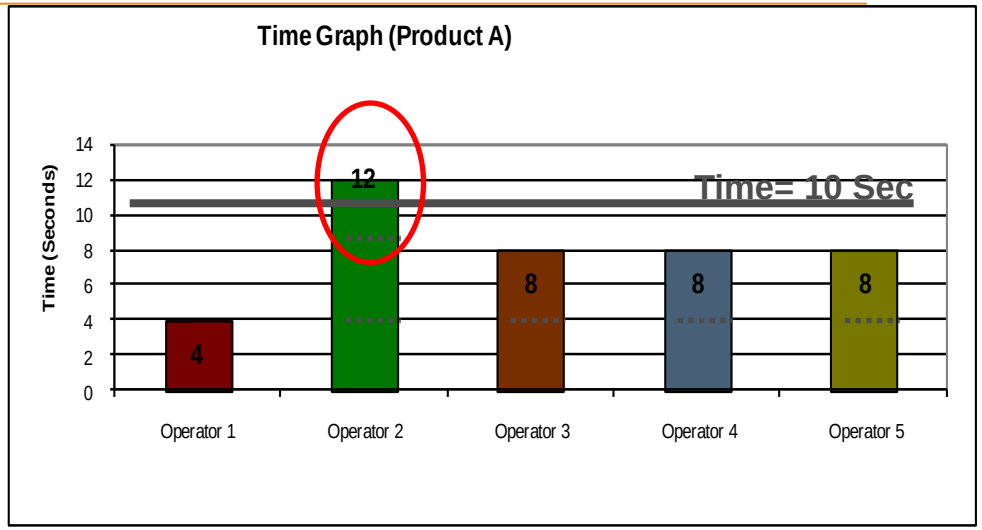


- Movement of materials, information, services and knowledge
- Examples from everyday
- Flow is created by eliminating queues and stops

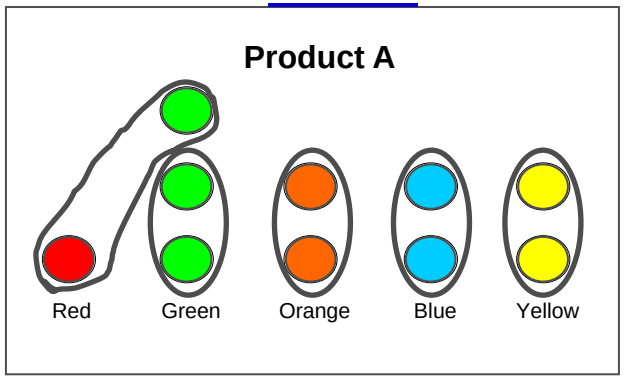
The Importance of Balancing Work…

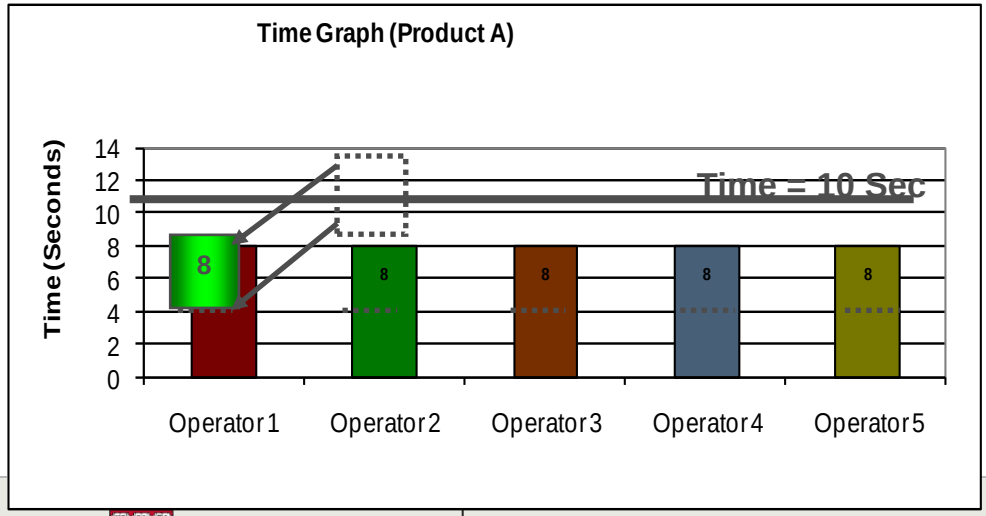
Before





After





Lunch

- Back to class in 30 minutes

Exercise

- Draw a Pig

Standard Work

- ***To make the best methods <u>consistent</u> among all workers.***

- Well defined, precise procedures for each person's work
  - Includes the precise work sequence, equipment and inventory required
- Key to continually improving a process
- Reduces variation
- Can include diagrams or plan view of workstations
- Visual pictures or video supplement can be very helpful

There can be no improvement in the absence of standards.

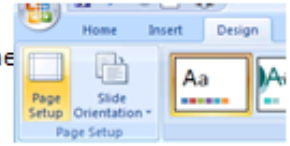
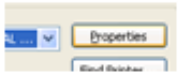
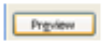
When Everybody's Responsibility Becomes Nobody's Responsibility

Standard Work Components

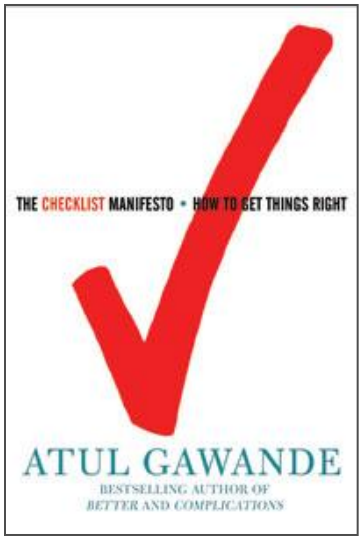
- Work Element (Major Step)
- Time
- Key Points
- Reasons for Key Points

Standard Work- In Action

Printing an Idea Board - Custom Request

	Major Step	Key Points	Reasons for Key Points
1	Open Idea Board PowerPoint File	Open unique idea board from requestor	
2	Change the PowerPoint slide size	Click "Page Setup" in the "Design" tab 	
		Change the width and height measureme to match the request. Click "OK". 	
		Re-size any graphics that were skewed with size	To ensure graphics are displayed properly
3	Print to the Plotter	Click the "Office Button 	
		Select "Print"	
		Select the plotter from the drop-down menu: \\UMMHCPRNT01\B12CQSP02	The plotter is the only printer capable of printing sizes larger than legal
4	Set the printing properties	Click "Properties" 	
		Select the "Landscape" optio 	Idea boards are landscape orientation (unless specified otherwise)
		Click the "More Sizes" buttor 	
		Change the width and height measurements to be **2" larger** tha the idea board size. Click "OK". 	To ensure the idea board edges do not get cut off during printing
		Click "OK"	
		Click "Preview" 	Verify the edges of the board are not being cut off by the page size
5	Print the Idea Board	Click "Print" 	

Simplest Form of Standardized Work – The Checklist



Surgical Safety Checklist

World Health Organization | Patient Safety

Before induction of anaesthesia (with at least nurse and anaesthetist)

Has the patient confirmed his/her identity, site, procedure, and consent?
- ☐ Yes

Is the site marked?
- ☐ Yes
- ☐ Not applicable

Is the anaesthesia machine and medication check complete?
- ☐ Yes

Is the pulse oximeter on the patient and functioning?
- ☐ Yes

Does the patient have a:

Known allergy?
- ☐ No
- ☐ Yes

Difficult airway or aspiration risk?
- ☐ No
- ☐ Yes, and equipment/assistance available

Risk of >500ml blood loss (7ml/kg in children)?
- ☐ No
- ☐ Yes, and two IVs/central access and fluids planned

Before skin incision (with nurse, anaesthetist and surgeon)

- ☐ **Confirm all team members have introduced themselves by name and role.**
- ☐ **Confirm the patient's name, procedure, and where the incision will be made.**

Has antibiotic prophylaxis been given within the last 60 minutes?
- ☐ Yes
- ☐ Not applicable

Anticipated Critical Events

To Surgeon:
- ☐ What are the critical or non-routine steps?
- ☐ How long will the case take?
- ☐ What is the anticipated blood loss?

To Anaesthetist:
- ☐ Are there any patient-specific concerns?

To Nursing Team:
- ☐ Has sterility (including indicator results) been confirmed?
- ☐ Are there equipment issues or any concerns?

Is essential imaging displayed?
- ☐ Yes
- ☐ Not applicable

Before patient leaves operating room (with nurse, anaesthetist and surgeon)

Nurse Verbally Confirms:
- ☐ The name of the procedure
- ☐ Completion of instrument, sponge and needle counts
- ☐ Specimen labelling (read specimen labels aloud, including patient name)
- ☐ Whether there are any equipment problems to be addressed

To Surgeon, Anaesthetist and Nurse:
- ☐ What are the key concerns for recovery and management of this patient?

This checklist is not intended to be comprehensive. Additions and modifications to fit local practice are encouraged.

Revised 1 / 2009

"Our struggle in medicine these days is not just with ignorance and uncertainty. It's also with **complexity**: how much you have to make sure you have in your head and think about. There are a thousand ways things can go wrong. We miss stuff. We are inconsistent and **unreliable** because of the complexity of care.

The **pilot's checklist** is a crucial component, not just for takeoffs and landings in normal circumstances, but even how you handle a crisis when you only have a couple of minutes to make a critical decision.“

Atul Gawande's 'Checklist' For Surgery Success, www.npr.org, 1/5/2010

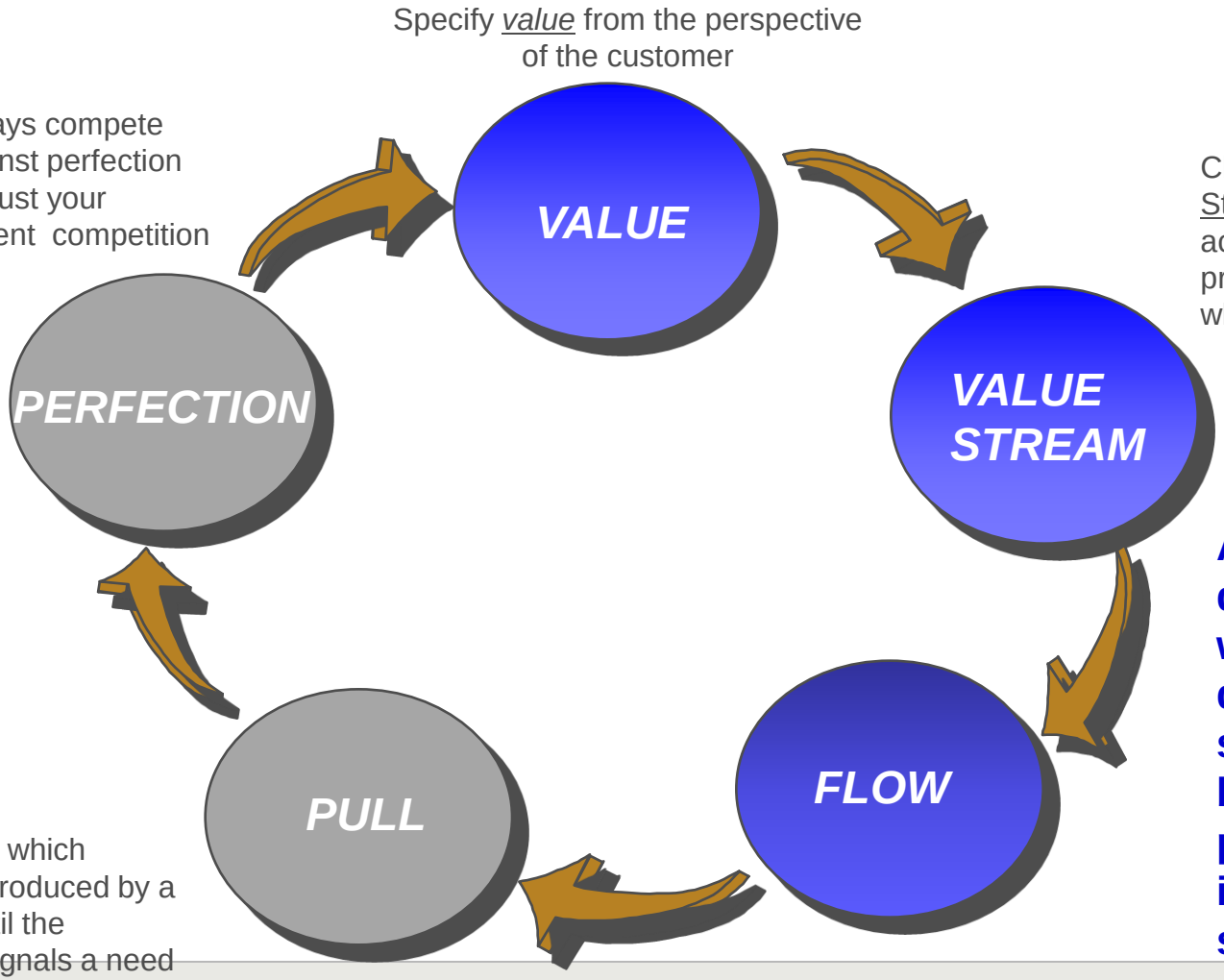
Professor in the Department of Health Policy and Management – HSPH

MD, MPH, Surgeon - BWH

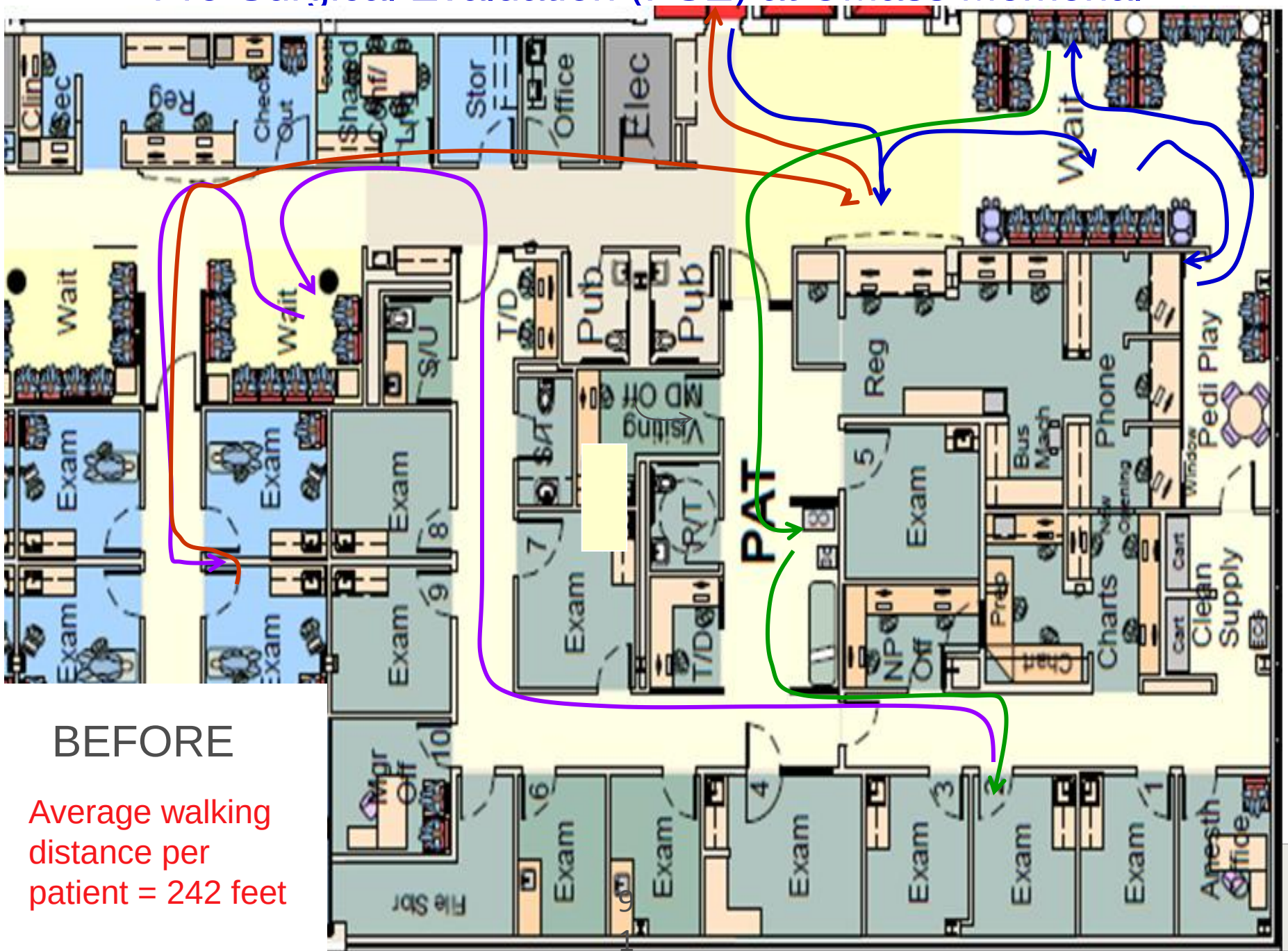
Break

Back in
10 minutes

5 Guiding Principles of Lean



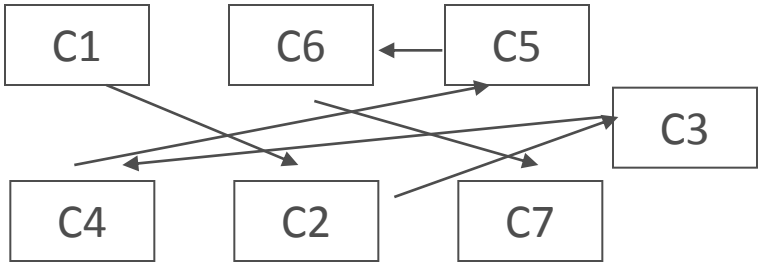
Pre-Surgical Evaluation (PSE) at UMass Memorial



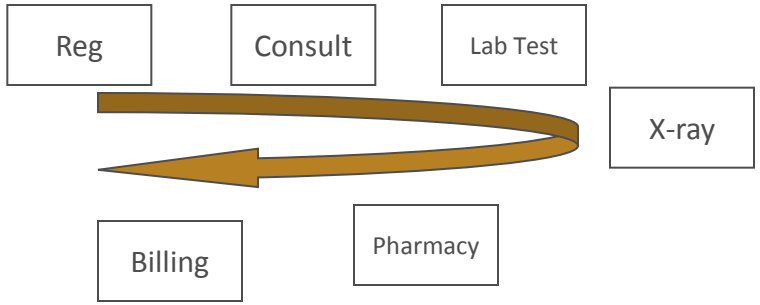
BEFORE

Average walking distance per patient = 242 feet

Cellular lay-out



A. Patient Walks



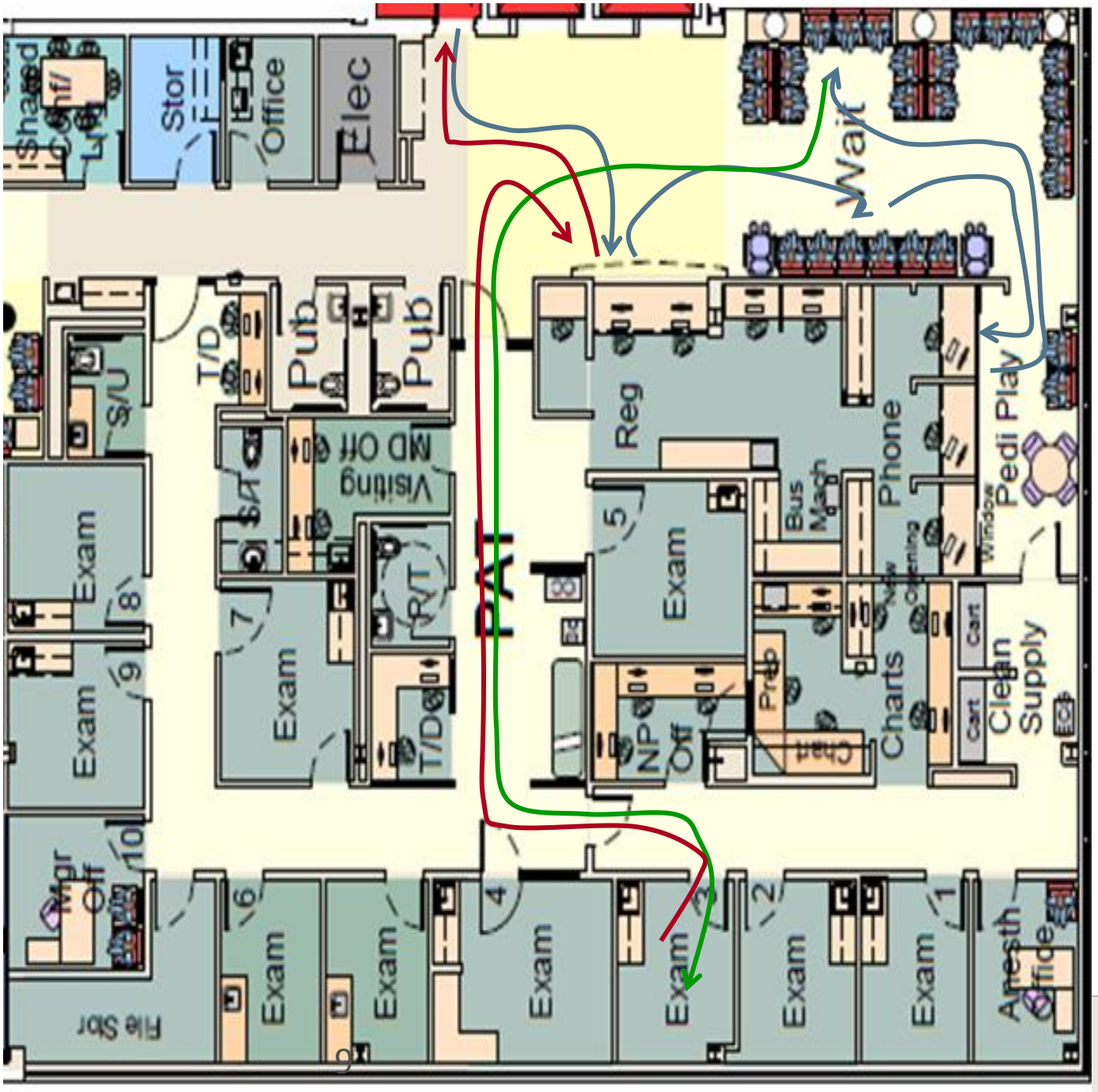
B. Provider Walks

AFTER

Patient stays in exam room entire time

Average walking distance per patient = 155 feet

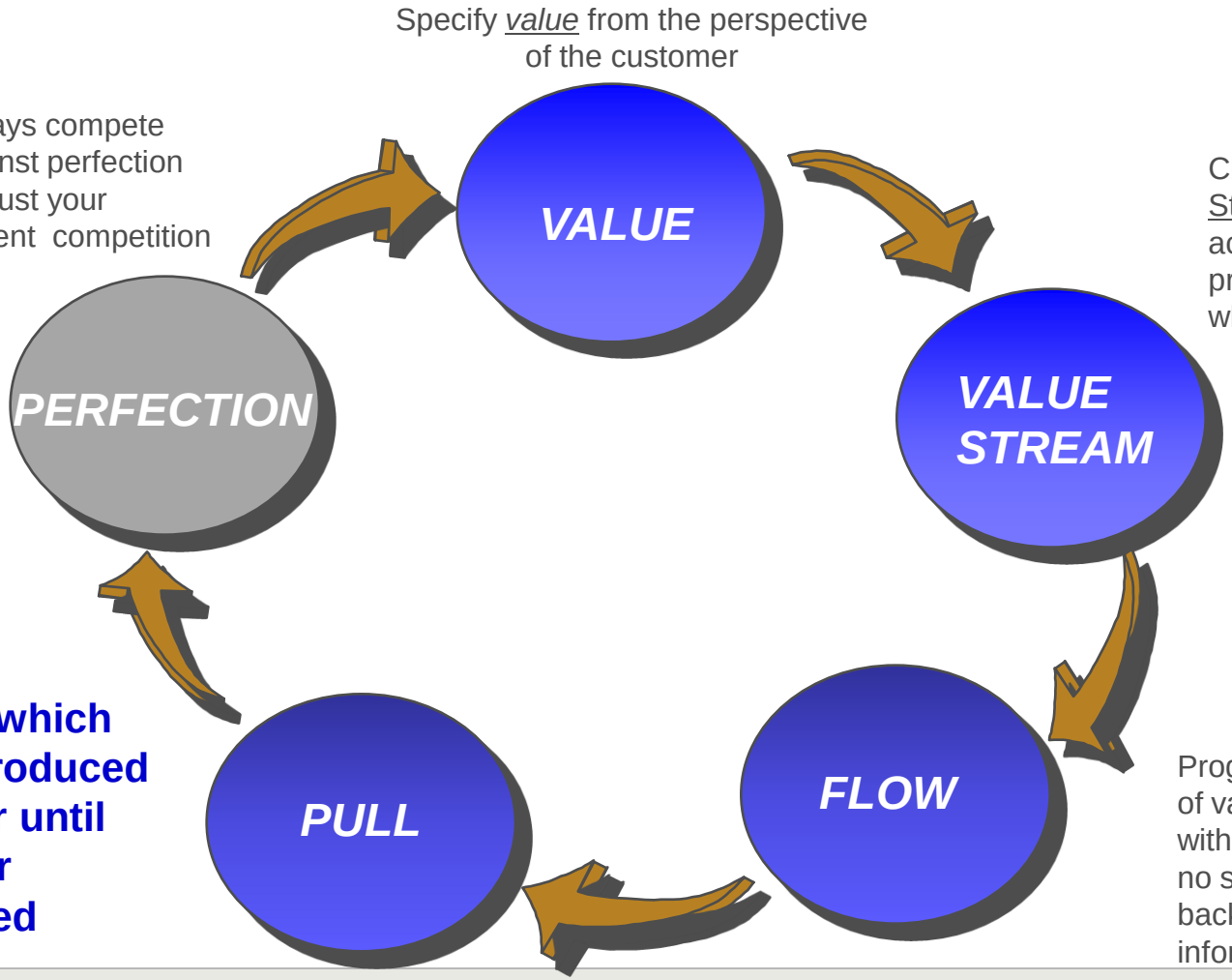
A 36% decrease in average walking distance



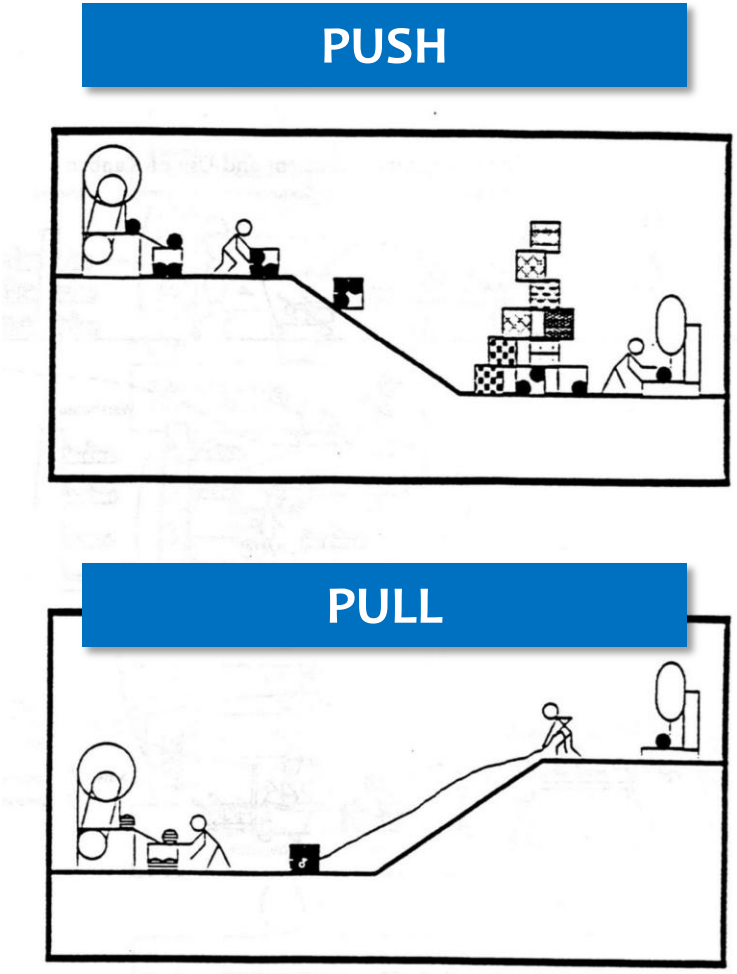
Takt time

1. Calculate your demand per shift or day
2. Calculate your available time (excluding breaks, meeting times)
3. Calculate your Takt time (availble time / demand

5 Guiding Principles of Lean



Pull Systems



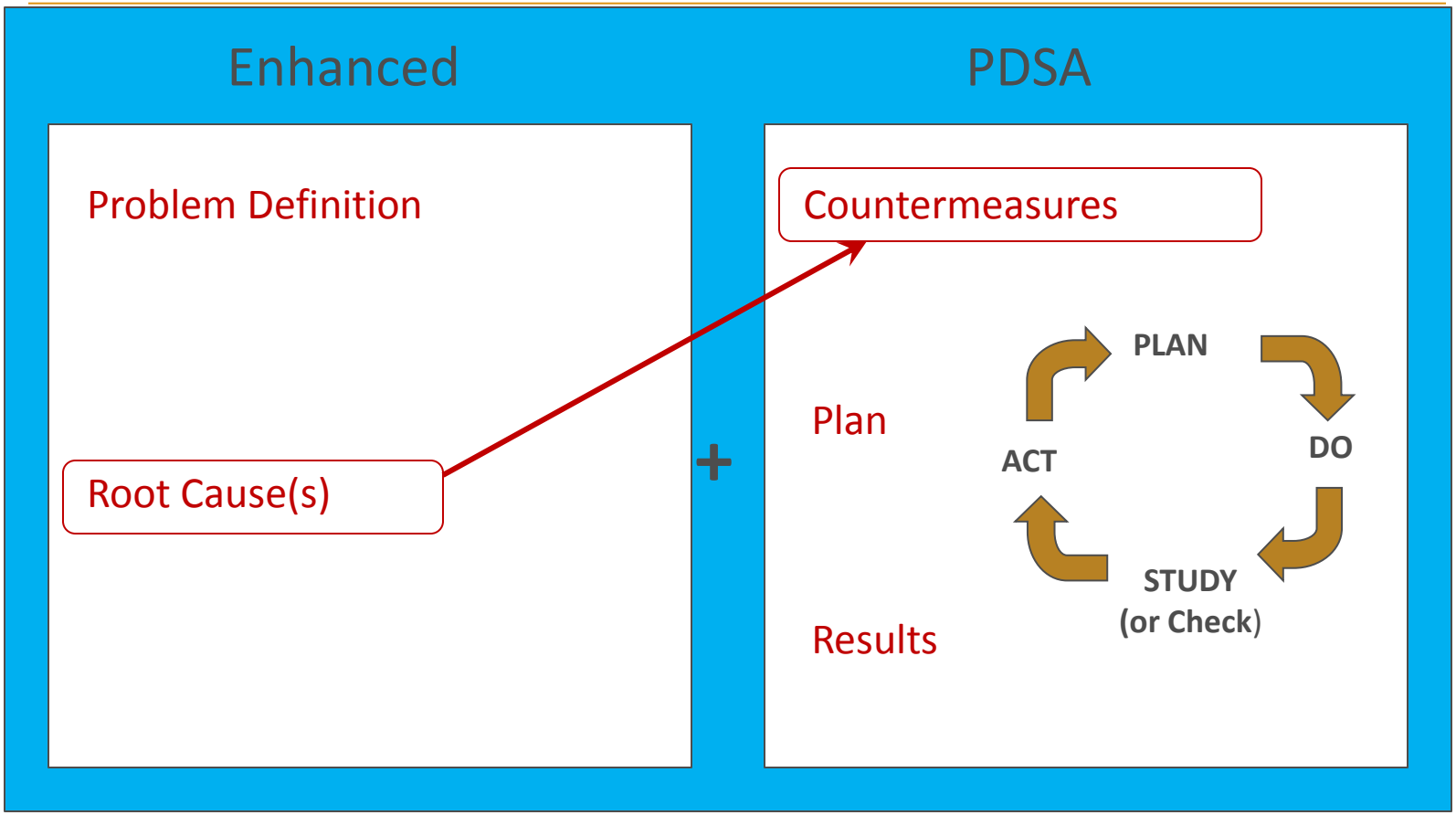
- **Push System:** High inventory, producer centric, make-to-stock, forecasting demand

- **Pull System:** Limited inventory, customer centric, make-to-order
  - Pull = response to demand
  - Pull means the customer getting what they want, when they want it, in the right amount.
  - “Kanban” or signal for production

A3 – The Basic Problem Solving and Communication Tool

- Tying it all together

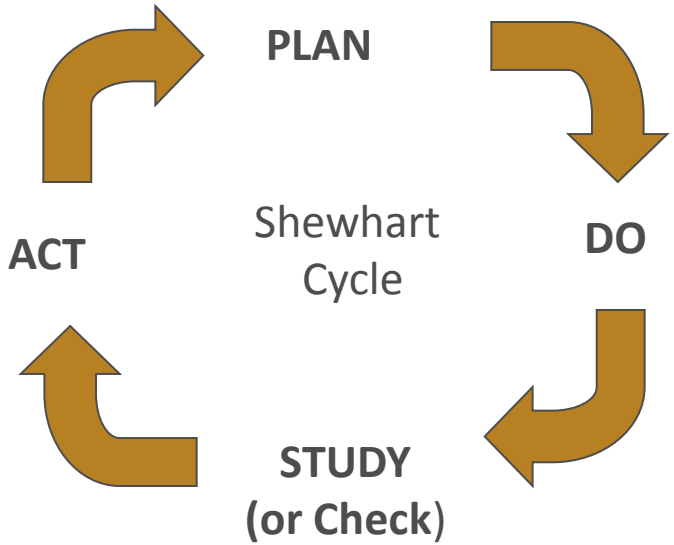
Enhanced PDSA: "A3"



Enhances "Plan" in PDSA with better understanding of the problem and causes, to generate better countermeasures

PDSA – Ensure Problems Solved

- Created by Shewhart in the 1930s
- Popularized by Deming first in Japan in the 1950s
- Scientific method
- At the core of all quality systems
- The foundation for the A3



Cycling through Plan, Do, Study, and Act until desired result is achieved, is essential to improving

A3 Example

A3 – Enhanced PDSA

Project Title: Answering Phones (Barre Family Health) | Owner: Sue Begley | Date: 04/02/2013

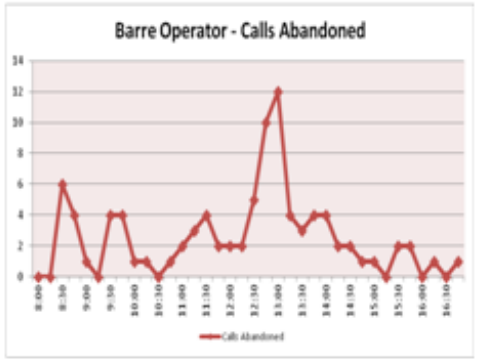
A3

Team Members: Dr. Earls, Karen, Megan, Jaime, Brenda, Melissa, Zailee

Problem Statement: The Barre Family Health phone answering process has a low (44%) service level and high (15%) abandonment rate, which leads to poor patient satisfaction (73% for ease of telephone operation), high call-back volume, patient waiting, and delays in care.

Scope In: All providers, all patients, all calls. Changes to the phone system are in scope.

Background/Current Conditions:
Clinic receives ~300 calls per business day (20 business days per month).



ALL CALLS	#	% of Total	% completed by person who answered phone
book appointment	226	36%	84%
all other	156	25%	62%
prescription	78	12%	63%
change/ verify existing appt	45	7%	87%
medical advice	42	7%	36%
referral	37	6%	54%
lab or test results	34	5%	44%
forms completed	16	3%	63%
total	634		

Root Causes:
Patients calling Barre multiple times about prescriptions
- Prescription was never filled
  - diagnosis code missing
    - Prescription was not linked to problem when written by MD

High Abandonment rate of phone calls
- Phone is in NOT READY status
  - Auto-switched when it rings and no one answers
    - High call volume
    - Staff doing other tasks
    - Staff didn't know phone was switched to NOT READY
  - Staff didn't log-out the day before

Goals: Increase patient satisfaction to 86% (ease of telephone operation). Increase service level to 85%. Reduce abandonment rate by 50% (considering time spent on-hold before abandonment). Improve Staff Satisfaction around answering phones

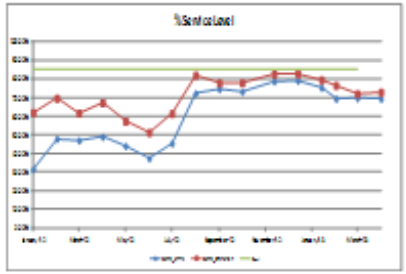
Estimated Project Completion:
Countermeasures implemented by 08 15 2012, ready to measure patient satisfaction first week of September.

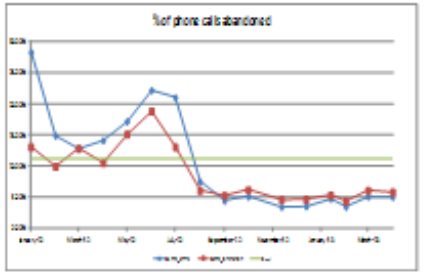
Plan - Do - Study - Act (PDSA)

Countermeasures (Plan):
- Investigate what Central Scheduling does in order to get the right information from the patient about Med Refills – what questions to ask and how to ask them
- How can we reduce the # of phone transfers within Barre Clinic and reduce the length of calls?
- Change to Lunch schedule to reduce abandonment rate during Lunchtime.
- Create awareness with providers and staff about importance of linking problem to prescription in order not to lose the diagnosis code. Jamie to bring up at next Pod meeting
- Poll staff for top 10 reasons why the leave their work area/enter Not-Ready status

Implementation (Do):
- Awareness of phones being in NOT READY status. Zailee to help Sue set expectations. Visual management tool allowing all staff to see whose phone is READY and whose is NOT READY (August).
- Separate Registration check-in and checkout started 08/07/2012
- New lunch schedules being built (11:30 – 12:15 and 12:15 – 1:00) – Go Live 08/13/2012
- Discuss implications of Not-Ready status at Business meeting 8/15 (Zailee)
  - Monitor Not-Ready status at all times (all staff) – minimize when away
  - Easier for manager to monitor with 2 screens
  - Use Agent Login/Logout report
- Everyone has a headset
- Use scheduling scripts to facilitate entering information directly into Allscripts (Zailee)

Results/Conclusion (Study):





Follow-up Actions (Act):
- Consider piloting 2 screens for front desk staff to help monitor phone volume
- Investigate use of tasking templates to reduce re-work and standardize the process
- Continue dialogue between nurses and front desk staff about phone transfers from front desk to pods
- Meet with Lean coach monthly to discuss data, recent findings, and PDSA cycles

Mr. Potato Head - The Plan-Do-Study-Act **Game**

- Round 4
- Same rules
- Switch bags!

4 Minutes!

- http://www.online-stopwatch.com/full-screen-stopwatch/

- Why did we pick 4 minutes?
  - If it takes 20-30 seconds to correctly assemble one Potato Head with no waste in the system, it should take maximum of 5 minutes to assemble all 9 if only 1 assembler. You have an entire team!

- Guinness Book of World Records' fastest assembly of a Mr. Potato Head: Samet Durmaz of Turkey.

6.62 seconds!

Metrics Scorecard

	Round 1	Round 2	Round 3	Round 4
# Complete				
# Errors				
# Correct				

Mr. Potato Head - Debrief

- Total Complete, # Correct, # Errors
- What did you notice?
- **Why**?

Data Visualization

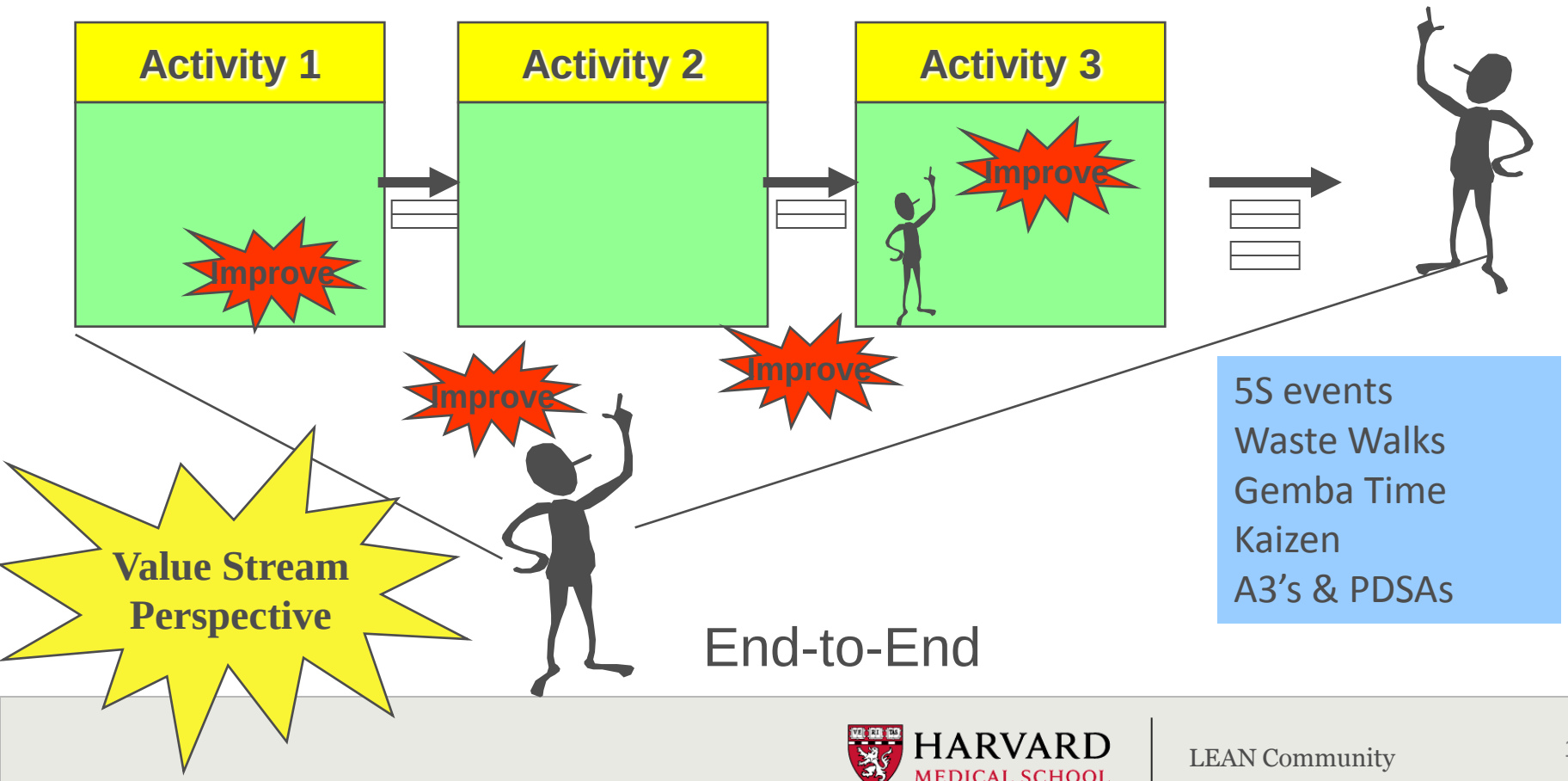
- Vision, of all the senses, is our most powerful and efficient channel for receiving information from the world around us.
- Approximately 70% of the sense receptors are dedicated to vision (30% to taste, hearing, touch, smell)

Purpose of visualization

- Analyzing
- Communicating
- Monitoring
- Planning

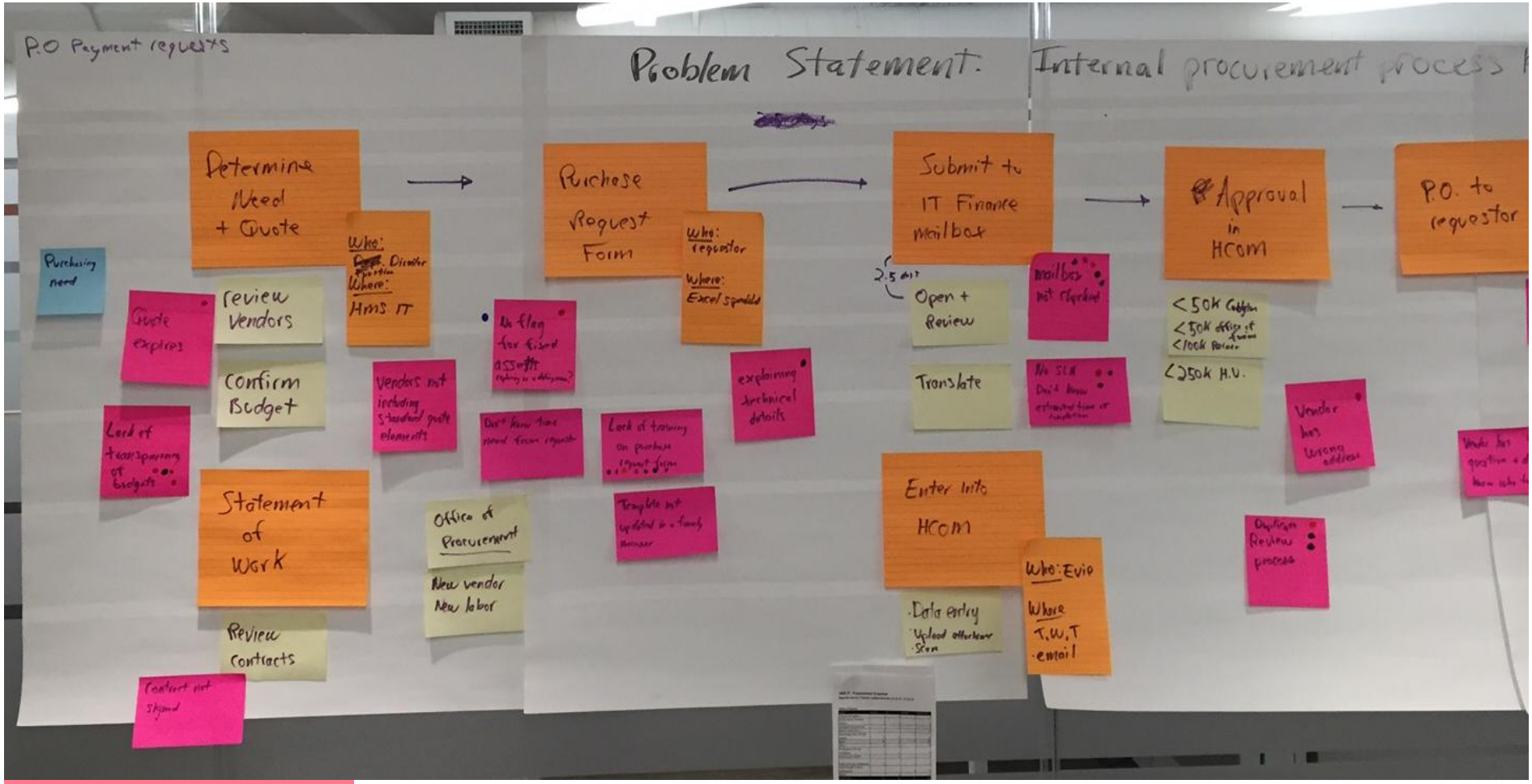
Value Stream View Yields Bigger Opportunities

- All organizations are made up of interlinked value streams
- All improvements should be evaluated on how they will help the value stream



IT Finance Procurement Current State Map

Problem Statement: Internal procurement process has time delays.



Pink = Waste/Opportunity!

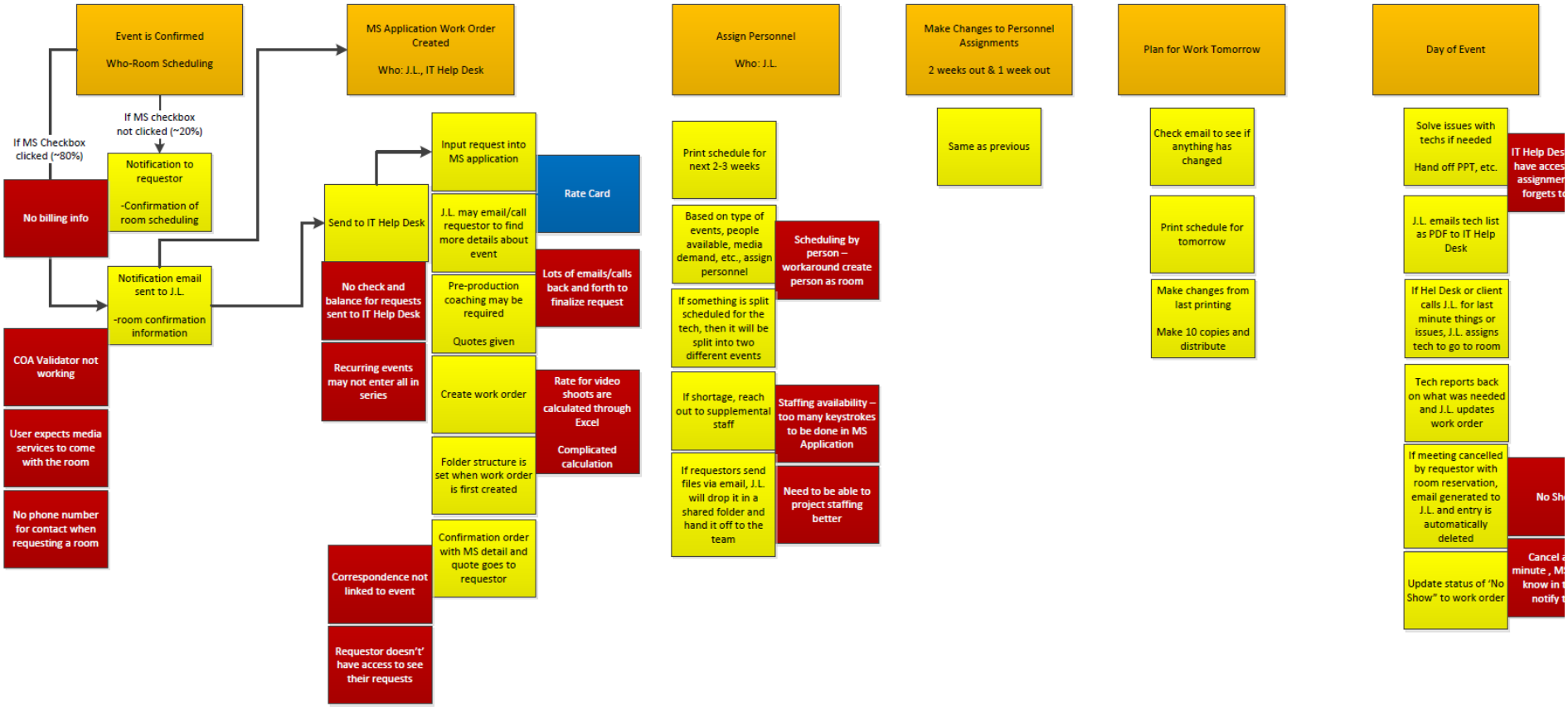
Yellow = Process Steps

GMAS

People with same job performing differently, impacts data integrity, stakeholder satisfaction, likelihood of audit findings, financial penalties, reputation and not getting paid.

Media Services

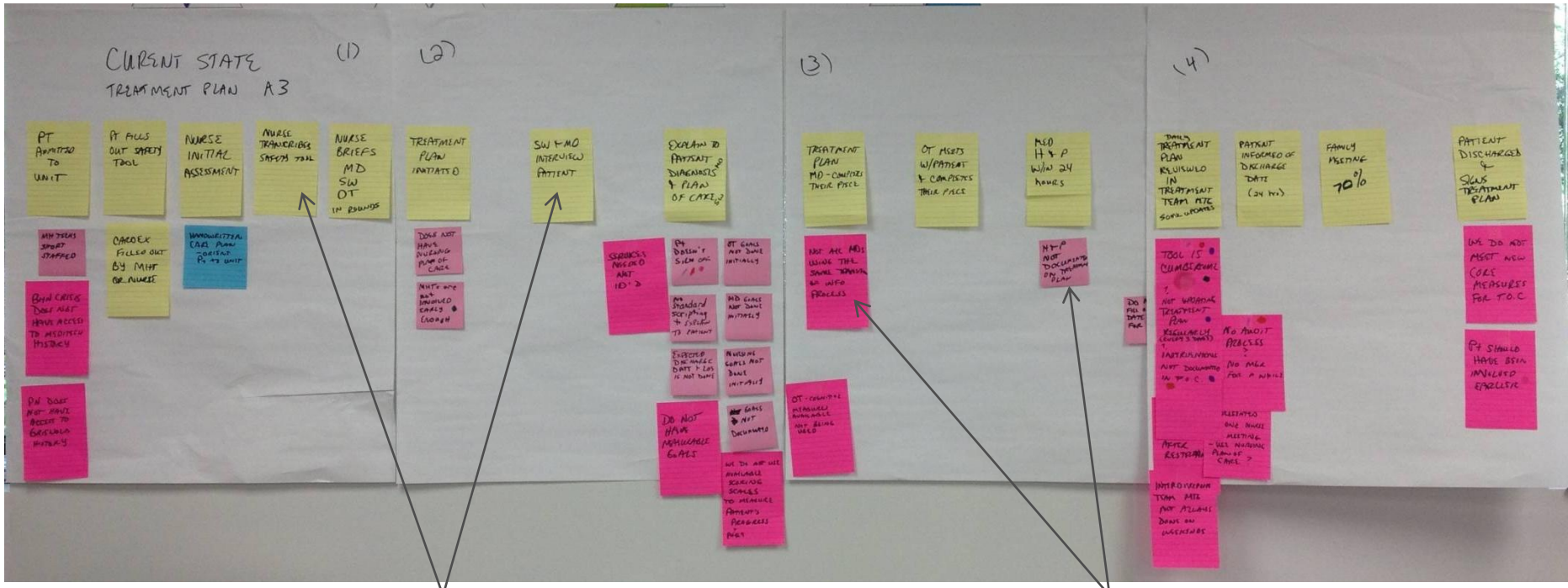
Problem Statement: HMS is implementing a new Room Scheduling system (EMS) which will replace legacy Room Scheduling and Media Services systems



Leader-led Value Stream Project

- **Planning**
  - Setup - leader orientation, Charter development, project scoping, roles, management structure, workshop participants and logistics, Lean training
  - Baseline performance metrics – what we're going to improve
- **Workshop:** Value Stream Mapping / Project Planning:
  - Step 1 – create Current State Map
  - Step 2 – design Future State; ideal-state;
  - Step 3 – develop a detailed Lean Action Plan to take the team from Current to Future state in 6-12 months

Current State Mapping for Parker North Treatment Plan



Yellow = Process Steps

15 steps in current process

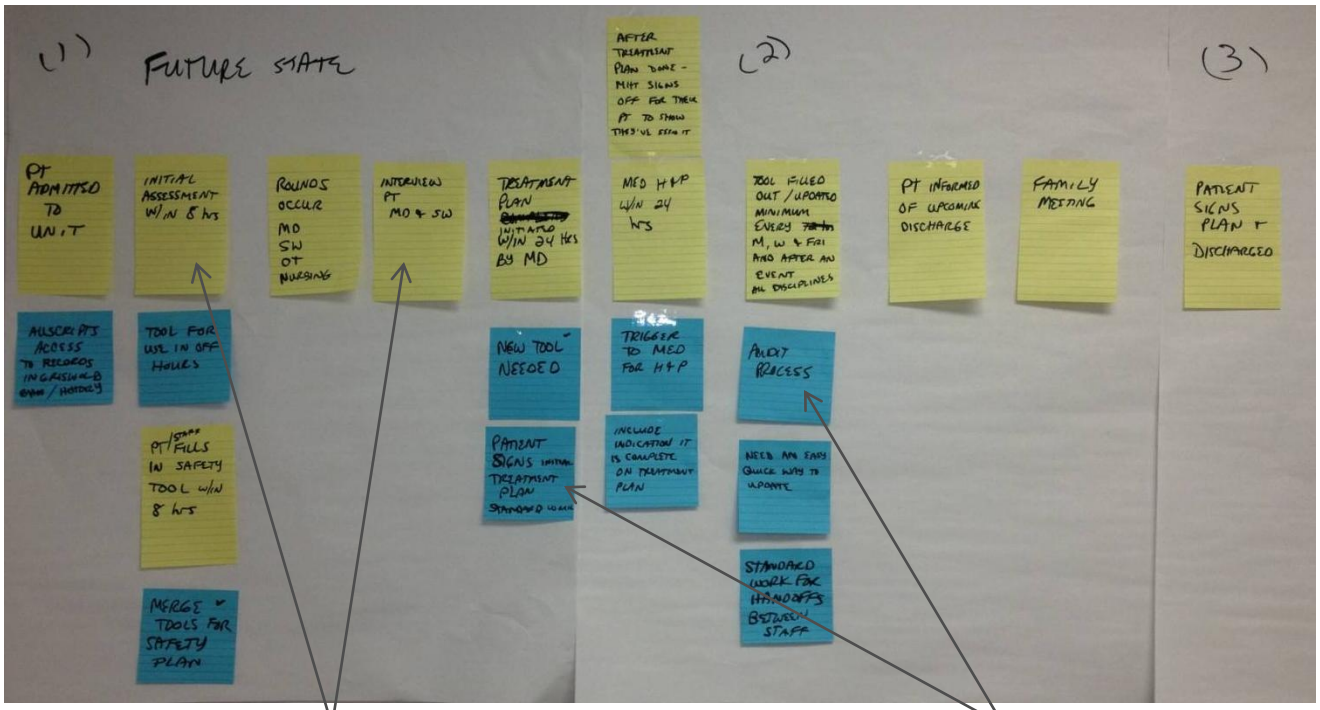
Pink = Undesirable Effects (UDE's)

Mapping the Future State

- Envision an '**ideal state**' for the process – how it should work for patients, employees, and partners

- Solve problems identified in the CS
- Scope to what you can accomplish in 6 to 12 months
- Eliminate as much waste as possible
- Study how the CS process fails. The FS should reduce or eliminate the possibility of breaking in this way
- Estimate value added time and flow time
- Try to shorten flow time as much as possible

Future State Mapping for Parker North Treatment Plan



Yellow = Process Steps

Blue = Action Items

10 process steps in future state

10 projects to get to future state

33% reduction!

Create Your Action Plan

- The action plan is the specific steps to get from the current state to the future state
  - Should include responsible person and due date
  - Dedicate People to Change Activities!
- Divide Action Items into 4 categories
  - **PDSAs, A3s, Kaizen events, and Parking Lot**
- Action items should be tied to UDE's and root causes
- Should include a Communication Plan for All affected
- Address WIIFM
  - Add up Potential Savings $$,
- Schedule first Follow-up Meeting (dates)

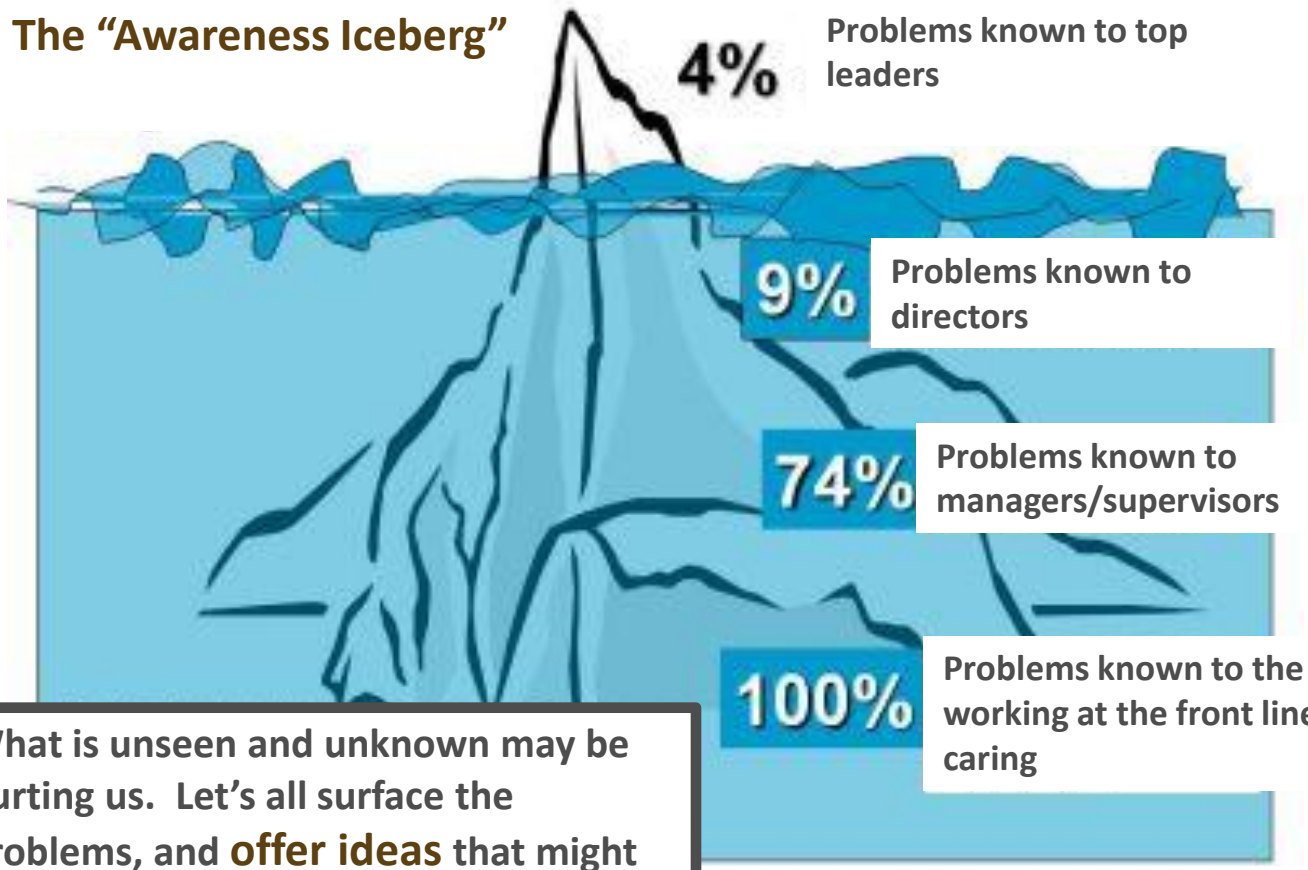
Break

Back in

5 minutes

Department Idea Systems

We want Ideas to Solve Problems lying beneath the surface. . .



What is unseen and unknown may be hurting us. Let's all surface the problems, and **offer ideas** that might solve them.

How can we harness and solve problems in our workplace?

- Teach Staff to recognize waste
- Staff must have a way to communicate the problems they are encountering
- Problems need to be prioritized against the goals of the organization
- Staff should be able to work on solving the problems constructively, using daily experiments, or PDSA cycles
- Items being worked on should be communicated

How Can We Improve?

METRICS

List here 1-3 focus areas for the department

1… 2…. 3….

NEW IDEAS	IDEAS IN PROGRESS	COMPLETED IDEAS

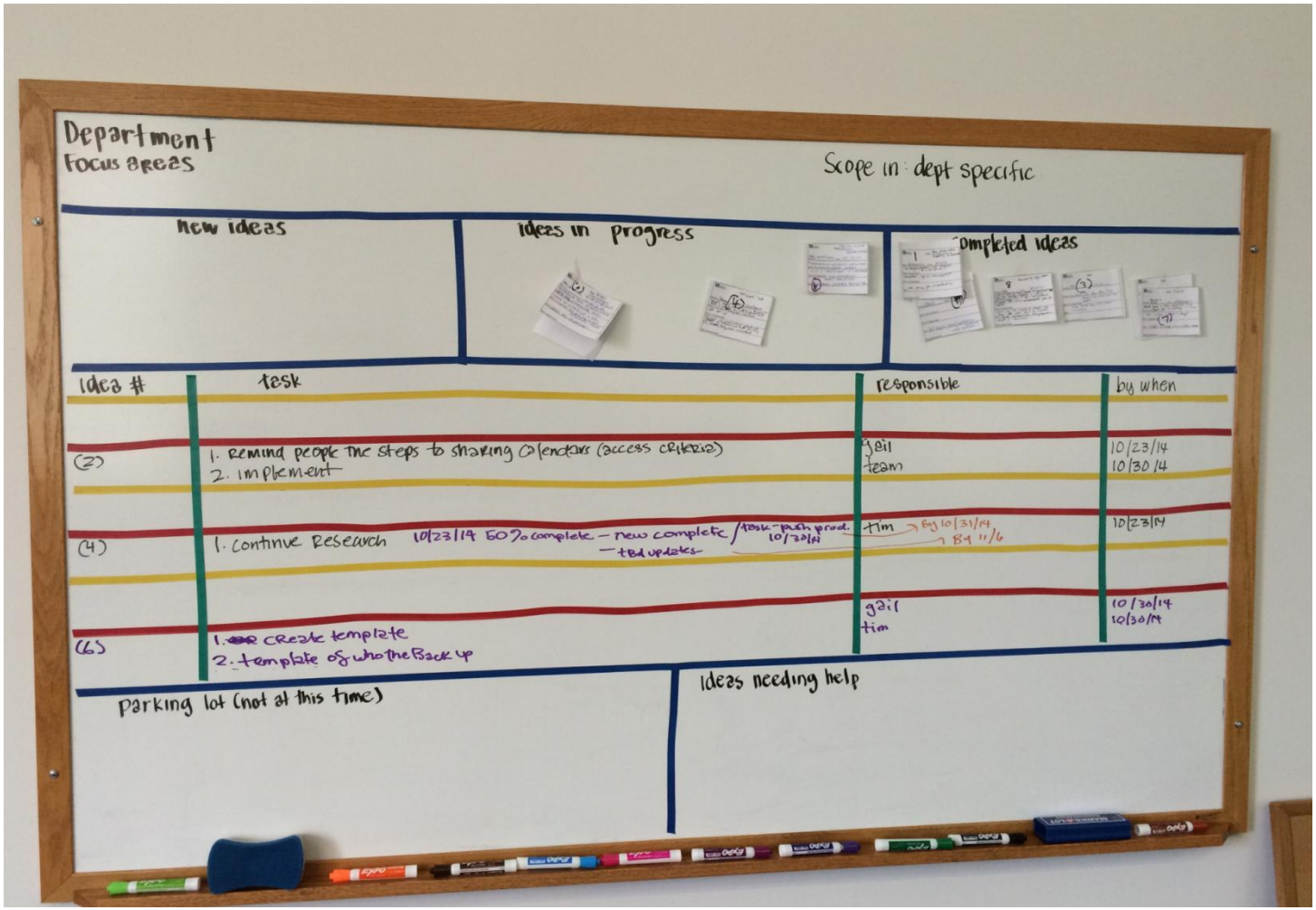
Idea #	Task	Responsible	By When

PARKING LOT	IDEAS NEEDING HELP

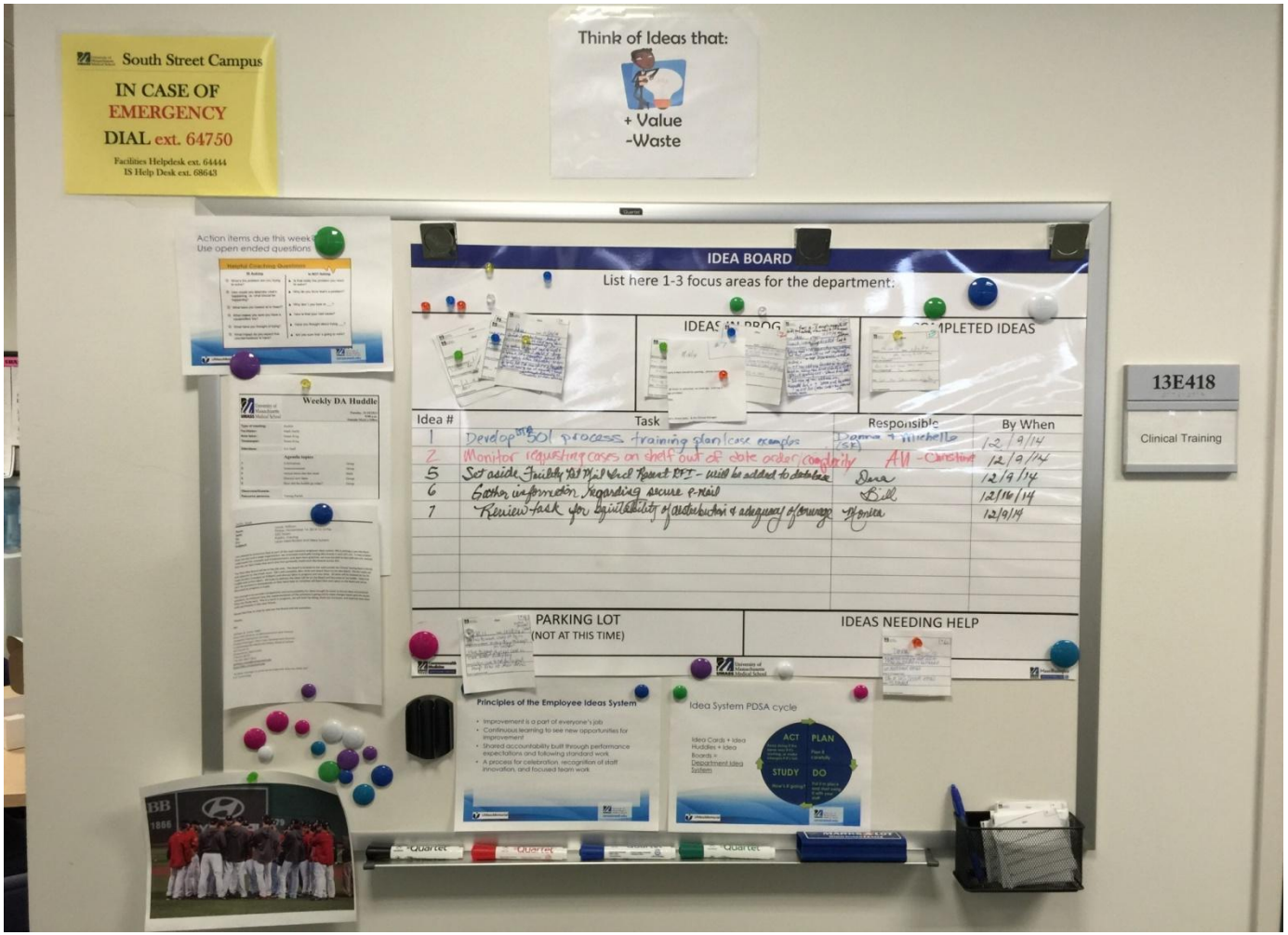
Idea Card

Idea			
Name(s):		Date:	
What is the problem/waste?			
Why is it happening?			
Idea:			
Date Implemented:			

Marketing Analytics Idea Board



CWM-DES Idea Board



Characteristics of Great Idea System

- They are managed **locally** (i.e., by the department)
- Ideas are **visible** to all
- **Group ideas** are encouraged
- There is a mechanism for **prioritizing**
- The implementation/execution of ideas is **tracked**
- There is a method to **escalate** ideas
- Ideas can be **replicated** across the system
- Linked to specific **goals**
- Ideas are reviewed in **weekly huddles**
- **Employees are empowered to implement ideas**
- **Praise** is provided for ideas implemented

Idea Board Guidelines

Leaders/Managers:

- **Plan it first** before you do it. . . remember **P**DSA.
  - Think about your department and the type of board that will initially work best for you.
- Get input from your staff
  - Discuss expectations and let them know that you and they are all learning together how to generate and implement ideas to solve problems.
- Communicate the Purpose

Scoping

Leaders/Managers:

- Set a clear Scope for the Ideas. For example:
  - **General ideas** of all types? Or **ideas to address a specific problem**?
  - "What gets in your way"
  - Eight Wastes
  - Specific departmental goals
  - Strategic Priorities
- Establish General Guidelines around the purpose, problem, or ideas
  - Low to no cost
  - Focused in your area
  - Can be Implemented in 30 days
  - Involves you in the solution

Don’t Forget to Celebrate

- Acknowledge and share success:
  - End Huddles on a high note.
  - Thanks!!!
  - Employee Comments
  - Accomplishments
  - Contributions to waste reductions and value-adding activities

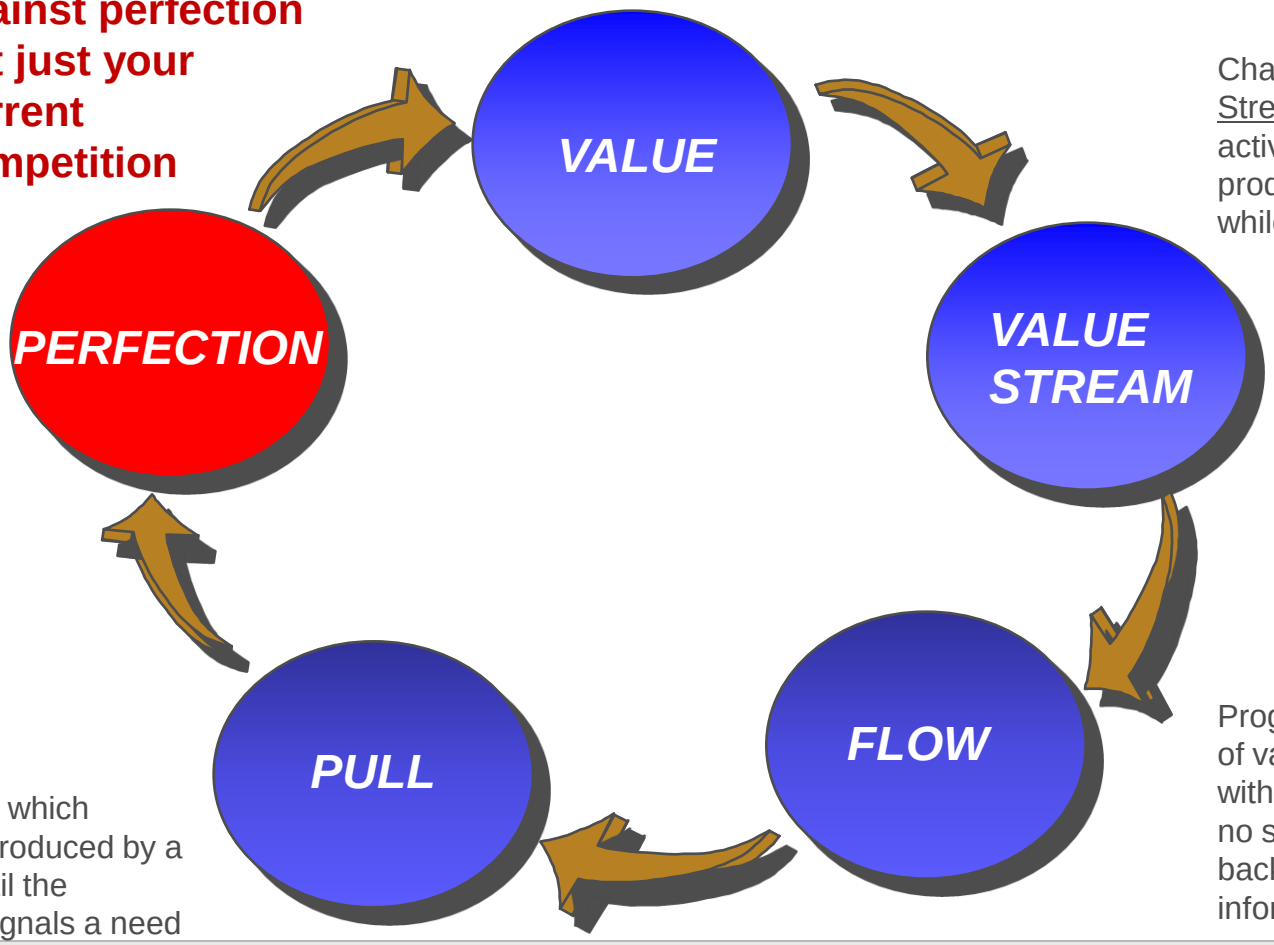
Getting Started

- Go after small ideas
- Make Ideas part of everyone's job
- Help Your People Come Up with More & Better Ideas
- It's ok to learn by doing

5 Guiding Principles of Lean

Always compete against perfection not just your current competition

Specify *value* from the perspective of the customer



Characterize the Value Stream (set of activities) for each product / process while removing waste.

Progressive achievement of value creating steps with minimal queues and no stoppages or backflows of product, information or services

A system in which nothing is produced by a supplier until the customer signals a need

It's All About People

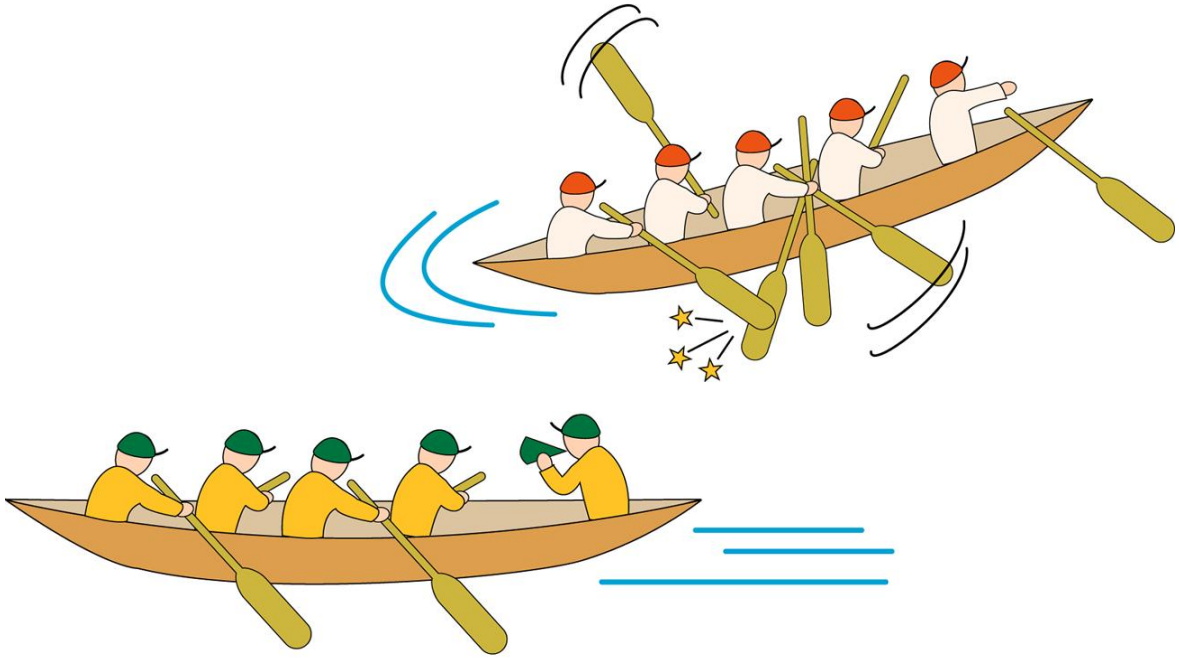
- It's the people who bring this system to life:
  - Working, communicating, resolving issues, and growing together.
  - Continuously
  - It **REQUIRES** employee involvement and leadership support

It's All About People

- Pre-reading themes: communication, team working, and performance metrics

Traditional Culture	Lean Culture
Function Silos	Interdisciplinary Teams
Managers Direct	Managers Teach/Enable
Benchmark to justify not improving	Seek perfection - the absence of waste
Blame People	Blame the Process - Root Cause analysis
Rewards: Individuals	Rewards: Group Sharing
Supplier is Enemy	Supplier is Ally
Guard Information	Share Information
Volume Lowers Cost	Removing Waste Lowers Cost
Internal Focus	Customer Focus
Expert Driven, Periodic Improvement	Process Driven, Continuous Improvement
Efficiency	Value

Efficiency vs. Total Effectiveness



You work for your team members.

Adapted from Jeff Liker, 2002

Creating A Non-Blaming Culture

New Paradigm -- Create a culture where:

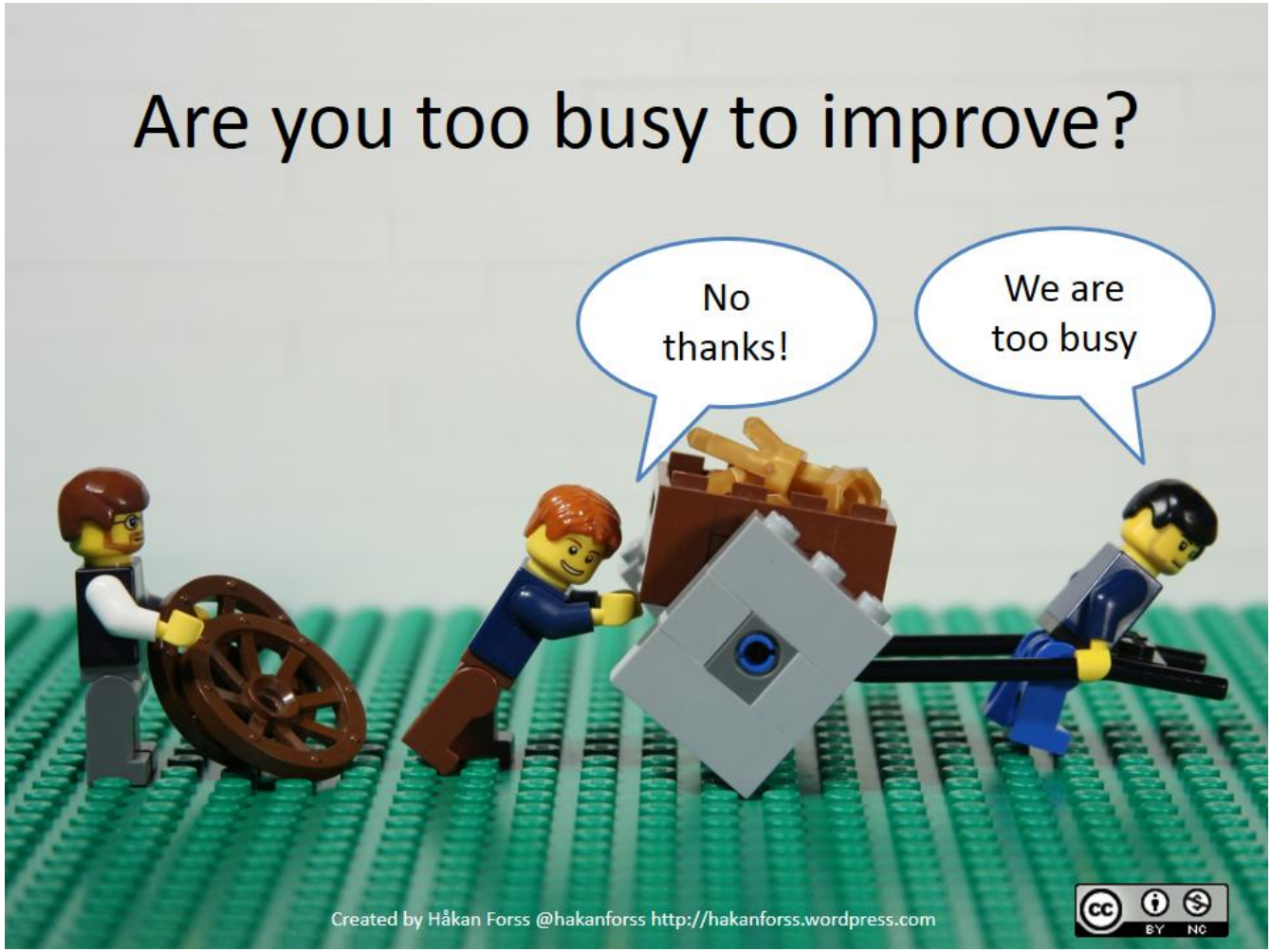
- Focus on the problem; not the person
- Problems are recognized as opportunities
- It's okay to make legitimate mistakes
- Problems are exposed because of increased trust
- People are not problems: They are problem solvers!
- Emphasis is placed on finding solutions instead of assigning blame
- Finding and exposing problems is expected of everyone

Addressing critical issues and involving leaders from the beginning reduces resistance at future critical points in the project

Respect for People

- Lean leaders can drive out cultural fear by showing a consistent and genuine respect for those who do the work – where the work is being done.
  - Go to the Gemba, ask questions and listen
    - Tap into their wisdom, experience, training, knowledge and critical thinking skills
  - ***Provide the time to work on process improvement***
    - Allowing and equipping the staff to improve their own work in a culture without fear is, simply, respect.

Lean is both a methodology and a philosophy



Summary of White Belt Training

- Increase value for our customers by eliminating waste
- It's about people!
- Continuously improving, using the tools
- Lean is an organizational philosophy, a system, a set of tools. Lean ≠ Mean
- Lean isn't a magic wand. It takes work and commitment – Get involved!
  - *"Insanity is doing the same thing over and over again and expecting different results."* Albert Einstein

In Conclusion

- Where do we go from here?

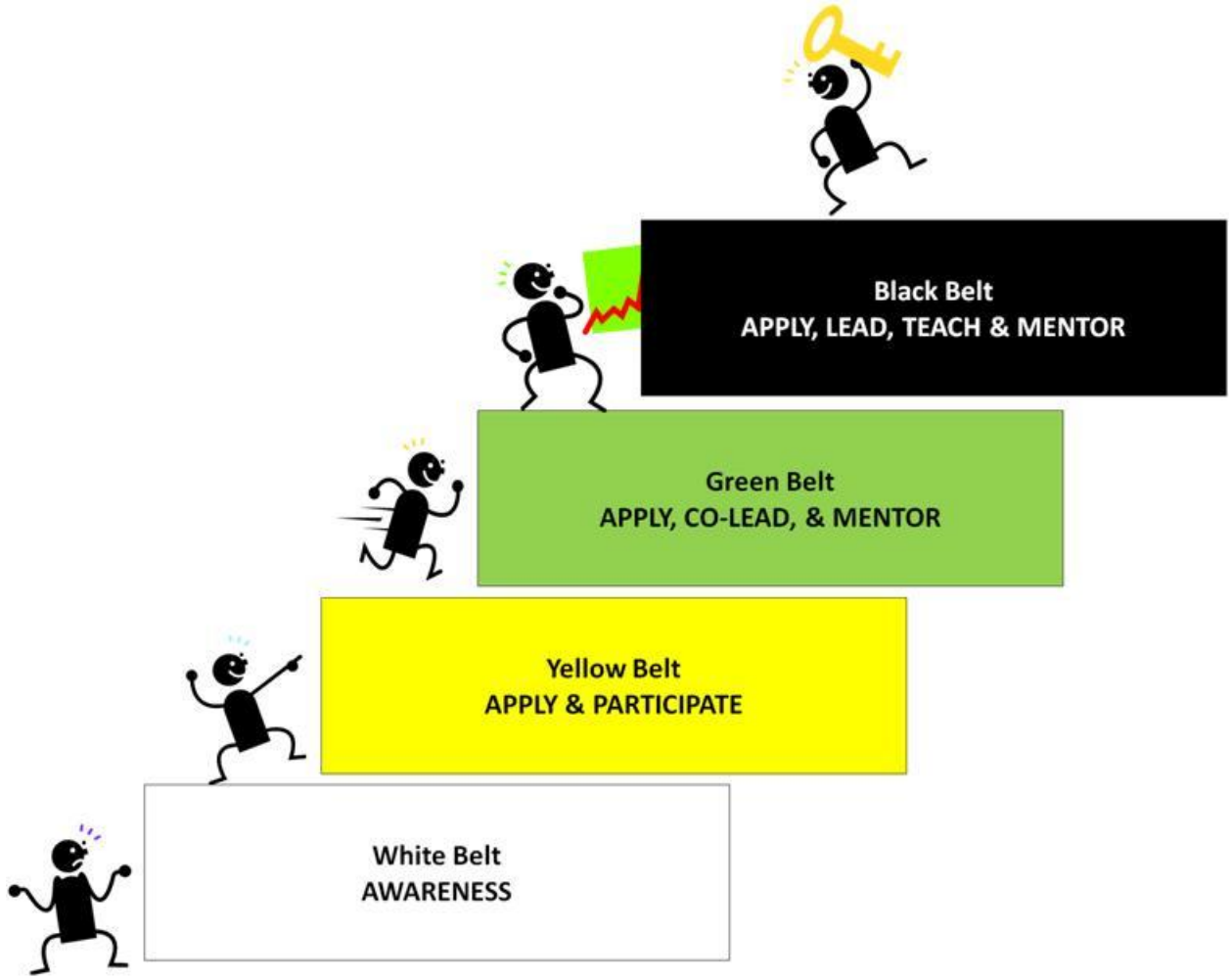
Learning Objectives

- Define ‘Value’ for the Customer at each step
- Develop eyes for ‘Waste’
- Stop Firefighting and get to the Root cause
- Learn Lean Tools to eliminate ‘Waste’
- Respect for People

What You Can Do

- **Congratulations - You are a "White Belt"**
  - Share your Lean knowledge with co-workers and others
- **Use Lean tools in a performance improvement project**
  - 5S, Waste Walks, A3 thinking, Standardized Work, Error proofing
- **Go to the Gemba! Look for waste and respectfully ask: "Why?" and "How can I help?"**
- **Be a Lean role model – walk the talk. Surfacing problems is good – talk about your own waste**
- **Respect others around you by listening**
- **Yellow Belt training – June 28th– Homework: *Devise a project problem statement, pre-reading***

Lean Belt Certifications at HMS



Thank You and Congratulations!

- Please reach for additional help on your idea/tools/identifying waste etc.

- Ernest Byers –

  ernest.byers@umassmemorial.org

- Lora Bouchard

  lora.bouchard@umassmemorial.org

Glossary of Lean Terms

- **5 Whys**

  A simple method to discover the root cause of a problem by asking five successively deeper “why” questions in order to determine the causes and effects of a problem, and to differentiate between root causes and symptoms.

- **A3**

  An essential lean tool for problem solving, business case development, and communication. An A3 is a single-page document (11x17 aka “A3”) fully describing a problem, its root causes, goals, proposed countermeasures, an implementation plan, and metrics for tracking achieved results. The scope of problem for an A3 is limited by the single page.

- **5S**

  A method of identifying and eliminating waste in the setup or organization of a work area, to enable optimal process performance. 5S is an acronym for five sequential steps in this method: Sort, Straighten, Shine/Sweep, Standardize, and Sustain.

- **Andon**

  A type of visual control placed in a production or service area, indicating the status of process and issues that have arisen. Andons can be used to stop a process until certain urgent issues are resolved.

… (cont)

- **Balancing Work**

  Averaging work loads across multiple providers or time, leveling the peaks an

  valleys that cause delays, errors, and other forms of waste.

- **Cells**

  Work areas arranged to group machines and materials used in a process together to maximize flow and minimize waste of time, transportation, space, inventory, and motion.

- **Charter**

  The project charter sets the stage for a successful Lean project and is the first

  document created by the project team. It is a document that is continually updated over time and is made collaboratively with multidisciplinary and multi-hierarchical input. The charter clearly articulates the case for change, team members, goals, and scope.

- **Checklist**

  A tool for reminding staff of the critical steps in a process, in a structured, visual manner, usually for the purpose of error proofing. It can be posted where a task is commonly performed or carried around to remind one of the steps in a process.

- **Countermeasure**

  Actions taken to reduce or eliminate the root causes of problems that are preventing the team from reaching goals. Countermeasures are tracked via the P.D.S.A. cycle.

… (cont)

- **Cost savings – “Light Green” & “Dark Green”**

  Light Green cost savings are intangible cost avoidances incurred to the organization or department due to process improvements. Examples include improved customer satisfaction and improved productivity, over time cost avoidance or “light green” dollars often become cost savings. *“Dark Green”* cost savings are tangible bottom line reductions, are easily defined actions that can be traced directly to the P&L (profit & loss); process improvements that result in real and measurable cost or asset reductions, examples include more revenue and less purchasing of materials.

- **Current state**

  The first step in value stream mapping – a visual depiction of the current, “as-is” process, developed by a cross-functional team representing all staff involved in the process, including those who provide inputs or receive its outputs. The current state will also identify and document problems, waste, and opportunities for improvement.

- **Error Proofing**

  The implementation of various mechanisms to prevent errors before they have a chance to occur. For example, visual controls such as signs indicating unsafe areas or medication labeling that reduces the chance of choosing the wrong med or dosage for a patient.

- **Fishbone**

  A cause and effect diagram used to flesh out and document the underlying, root causes of an undesired condition.

… (cont)

- **Flow**

  One of the main goals of lean thinking, flow is the seamless movement of people, material, or information through a process. Lean strives for smooth and continuous flow without waiting or other types of waste.

- **FMEA**

  Failure Modes Effects Analysis: Proactively used in countermeasure design, it is a proactive analysis of failure modes within a process and classification by the severity and likelihood of the failures. What and where could this possibly go wrong? What can we do to prevent it from happening?

- **Future state**

  A visual depiction of the new or modified, "to-be" version of a process after re-designing it to remove waste identified in the current state, and to add new value for customers, in a value stream mapping exercise.

- **Gemba**

  Literally translated from Japanese as 'the actual/real place', gemba is where the work of a process takes place. The idea is that problems and issues are best understood when viewed in person. *Going to the gemba* is a critical step in any lean process improvement effort.

- **Kaizen**

  A continuous improvement activity bringing together multiple participants in a process to brainstorm and implement rapid changes and improvements.

… (cont)

- **Kanban**

  Japanese word for signboard, used as a signal to communicate between processes, stop/start, ready/not ready.

- **Lean Organization**

  An organization that constantly maximizes value for the customer by continuously evaluating process performance for opportunities and making changes to eliminate waste.

- **PDSA**

  A four step cycle applying the scientific method to continuous improvement: *Plan* – evaluating the problem and stating the objective, *Do* - carrying out a test, *Study* - collecting and analyzing data, and *Act* - refining the change based on the results. PDSA also is the right side of the A3 after root cause(s) are obtained. Plan Do *Check* Act was popularized by Dr. W. Edwards Deming and is used interchangeably with PDSA.

- **Process Mapping**

  A visual representation consisting of all activities in a process. Process maps differ from value stream maps in the following ways: 1. they're more detailed, and 2. they typically don't include process times for each step in a process, as value streams do.

… (cont)

- **Poka-yoke**

  A type of error proofing in which a mechanism or step in the process prevents certain errors from occurring. An example is the mechanism which disables a kitchen microwave when the door is open, preventing dangerous radiation from escaping.

- **Pull**

  A further improvement over continuous flow, in which customers are able to “pull” value through the value stream as needed, *just-in-time,* rather than waiting for suppliers to push products and services through on their own schedule. Pull often uses a signaling system to trigger production and delivery when needed.

- **Root Cause**

  The initiating, original cause of a chain of events that leads to a certain outcome, usually a problem or undesired condition (waste). Lean methods for finding root causes including 5 Whys and fishbone diagrams.

- **Single-piece flow**

  An ideal state of production or services delivery where products or services move through a designated process one at a time rather than in batches, thereby reducing waiting, overproduction, work-in-process inventory, and errors.

… (cont)

- **SIPOC**

  Suppliers, Inputs, Outputs, Customers: Used to scope a project, to ensure proper

  subject matter experts for the team, and to develop a preliminary understanding of the process and key metrics.

- **Spaghetti diagram**

  A type of flow chart which may be used to identify and document transportation and motion waste in a process resulting from poor layouts in a process. Spaghetti diagrams trace the path followed by staff, equipment, or materials to visually show excess movement.

- **Standard work**

  A clear, precise description of all the steps required in the production and delivery of a product or service, enabling consistency in the final product. Descriptions should include what is to be done, how, and why. Standardizing work is considered a prerequisite to improving any process. “Standard” doesn’t mean identical – it allows for reasonable flexibility required in any process.

- **Toyota Production System (TPS)**

  The core of Toyota’s business philosophy and culture, on which “lean” is based. Its two main pillars are just-in-time and jidoka (ensuring that quality problems are not passed from part of a process to the next). A third, central pillar is the people pillar, ensuring the respect for people in any process improvement.

… (cont)

- **Value**

  What we aim to deliver to our customers, through all of our clinical and administrative processes and resources. Value in a lean sense is always defined by the customer, and always desired by the customer. Value is only what the customer wants, and what they are willing to pay for.

- **Value Stream Mapping**

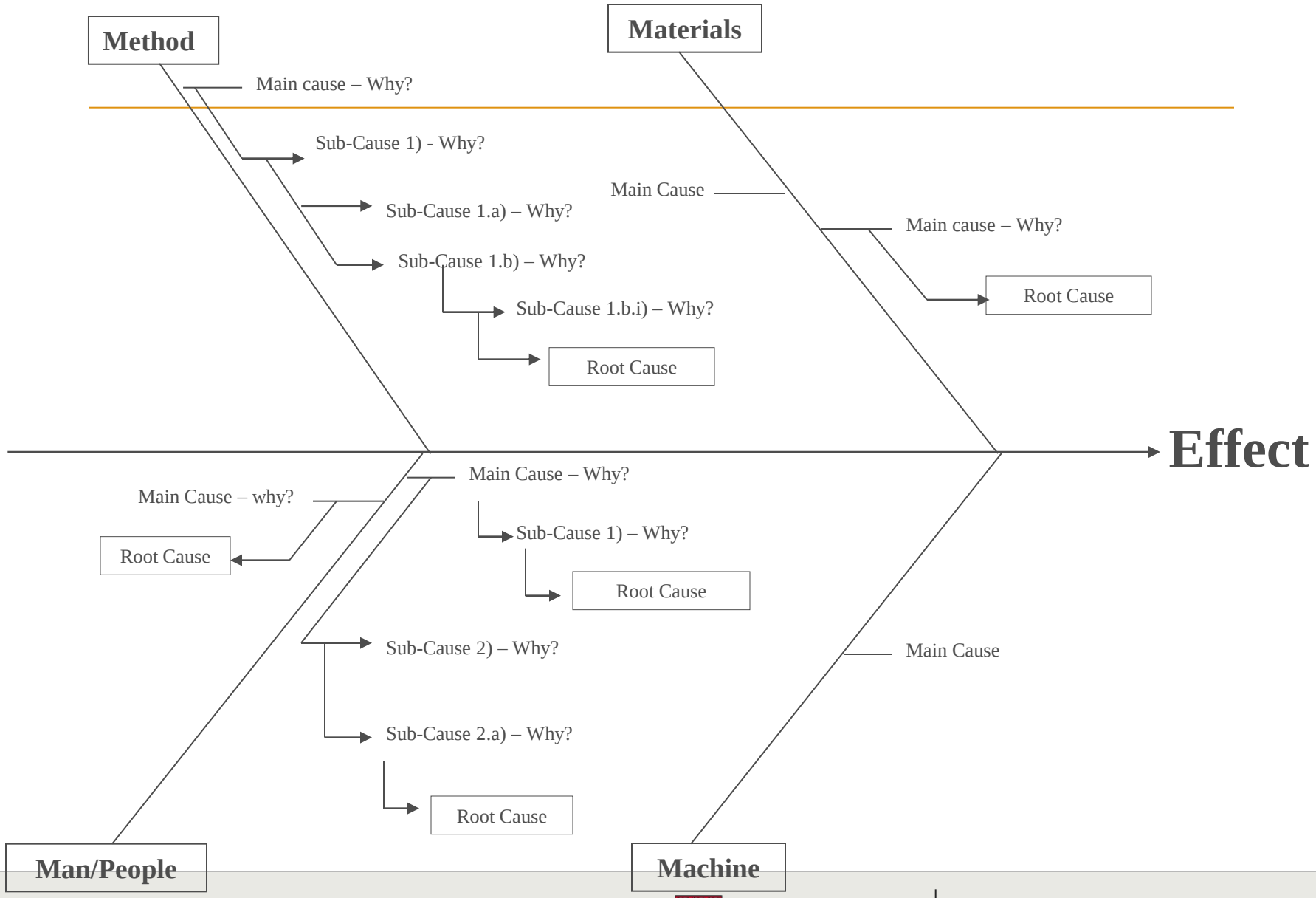
  Value stream mapping is a lean technique used to analyze and design the flow of materials and information required to bring a service to a consumer. Driven by a charter, it is a multiphase event which includes mapping of the current, ideal, & future states, concluding with an action plan to be completed in a set amount of time, typically one year.

- **Waste/U.D.E.**

  UDE stands for UnDesirable Effects in a process; they are synonymous with Waste, also known as “non-value added” activity. They are actions or activities in a process, procedure, or service that do not add value (what the patient cares about and needs). Use D.O.W.N.T.I.M.E to see and surface waste and begin the problem solving process.

Fishbone Diagram

Date: <date>



Lean Learning Resources – part 1

Lean Blog – Mark Graban's Lean in hospitals, business, and our world - www.leanblog.org

A3 Thinker - for iPhone and iPad – in ITunes store 2015

Articles and publications:

- **Eliminating waste in US health care**. *Jama*, *307*(14), 1513-1516. Berwick, D. M., & Hackbarth, A. D. (2012).
- **Going Lean in Health Care**, IHI Innovation Series white paper. *Cambridge, MA: Institute for Healthcare Improvement.(Available at www. IHI. Org.* Miller, D. (2005).
- **Learning to lead at Toyota**. *Harvard business review 82*, 78-91. Spear, Steven J. (2004)
- **Decoding the DNA of the Toyota production system**. *Harvard Business Review*, *77*, 96-108. Spear, S., & Bowen, H. K. (1999).

Books (many are available as e-books and audiobooks):

- **The Toyota way to lean leadership: achieving and sustaining excellence through leadership development**. McGraw-Hill. Liker, J. K., & Convis, G. L. (2012),
- **Understanding A3 thinking: a critical component of Toyota's PDCA management system.** CRC Sobek II, D. K., & Smalley, A. (2011).
- **Lean thinking: banish waste and create wealth in your corporation**. Simon and Schuster. Press. Womack, J. P., & Jones, D. T. (2010).

Lean Learning Resources – part 2

- **Toyota kata: Managing people for improvement, adaptiveness, and superior results.** New York, NY: McGraw Hill. Rother, M. (2010).
- **Gemba Kaizen: A Commonsense, Low-Cost Approach To Management .** McGraw-Hill. Imai, M. (1997).
- **Learning to see**. *Lean Enterprise Institute, Boston.* Rother, M., & Shook, J. (1999).
- **Managing to learn: using the A3 management process to solve problems, gain agreement, mentor and lead**. Lean Enterprise Institute. Shook, J. (2008).

Websites and Resources:

- **Lean Enterprise Institute** (LEI), Cambridge, Massachusetts. www.leanblog.org

Videos

- **Lean Applied to Us, Bill Peterson –** TEDxKnoxville - https://www.youtube.com/watch?v=tfQiGDUBdD0
- **Lean Roundtable #1, hosted by Paul Akers** - What Do You Struggle With, https://www.youtube.com/watch?v=WFDuE5xkIeI
- **Lean Roundtable #2, hosted by Paul Akers –** 2014 Most Important Thing - https://www.youtube.com/watch?v=w_dTMxmW1zw
- **Lean Roundtable #3, hosted by Paul Akers,** How Engaged is Your Team? - https://www.youtube.com/watch?v=pjl0xWSpVr8

Lean Learning Resources – part 3

Podcast

- **Lean Leadership with Chris Burnham (series), podcast -** http://www.leanleadershippodcast.com/
- **This American Life with Ira Glass (single episode)** how one of the worst auto plants in America started producing some of its best cars, **podcast -** http://tal.fm/561

Here is the path to this document - N:\HMS Lean Initiative\Training Session Slides and Templates