LEAN for Lab Leaders

Lab Quality Confab 2013

BD

Topics

- ✓ Introduction
- ✓ Setting the Stage - Six Sigma vs. LEAN
- ✓ Laying the Foundation – Basic LEAN Concepts
- ✓ From Concept to Execution – Identifying Improvement Opportunities
- ✓ How to make it Happen – Implementation Tools
- ✓ Long-term Success – Process Sustainability
- ✓ Summary

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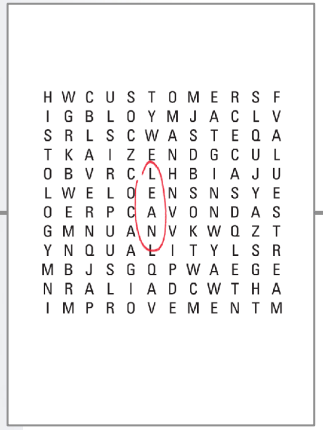
Introduction – Katja Lehmann

BD MPD™ Program
Measure,
Predict,
Deliver

GLOBAL SOLUTIONS
OPTIMIZATIONS
SPECIALIST
Since 2012



WORKFLOW
CONSULTING

2009- 2012

DBSL

2005- 2009

6σ

SIX SIGMA
BLACK BELT

2003- 2005

Leica
MICROSYSTEMS
Focus on Quality

QUALITY
MANAGEMENT

2001- 2003

Icebreaker - Interview

- Divide into pairs
- Take **five** minutes to interview each other
- Each interviewer has to find 3 interesting facts about their interview partner (2 related to work/job and 1 personal)
- Present the most interesting fact about your interview partner to the rest of the group

Expectations for this workshop

- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....

Ground Rules

- Silence your cell phones
- No PC's
- Take restroom breaks as needed
- Participate, Participate, Participate!
- .....
- .....
- .....
- .....
- .....

Setting the Stage

Six Sigma vs. LEAN

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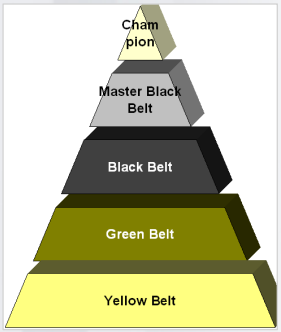
Six Sigma

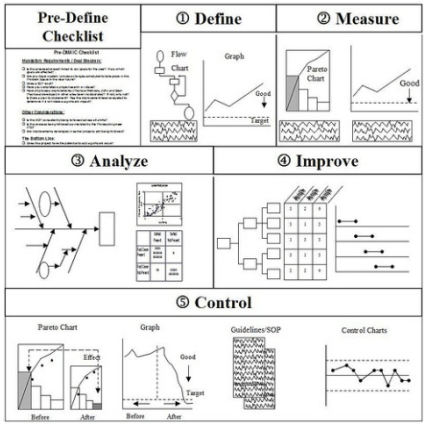
6σ

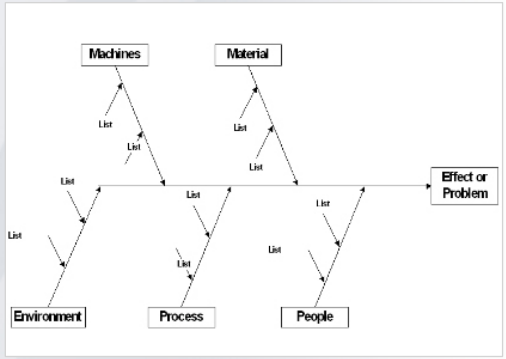
- Improve the quality process outputs
- Error reduction
- Variation reduction

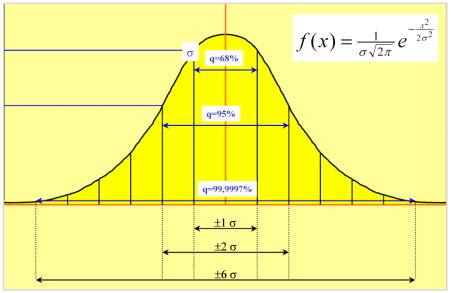
Six Sigma


Cham pion
Master Black Belt
Black Belt
Green Belt
Yellow Belt


Define
Measure
Analyse
Improve
Control


Pre-Define Checklist
① Define
② Measure
③ Analyze
④ Improve
⑤ Control
Pareto Chart
Graph
Guidelines/SOP
Control Charts


Machines
Material
Effect or Problem
Environment
Process
People
List


σ
q=68%
q=95%
q=99,9997%
±1 σ
±2 σ
±6 σ


ROI
ROI
ROI
ROI

Six Sigma

6σ

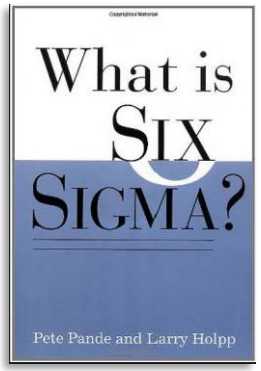
- Bill Smith 1986

MOTOROLA

- Demings Plan –
  Do-Check-Act Cycle

GE Healthcare

- What is Six Sigma?
  Pete Pande / Larry Holp, 2001



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LEAN

- Create “more” value with less work
- Eliminate non-value adding process steps
- People – Process – Equipment
- Continuous improvement

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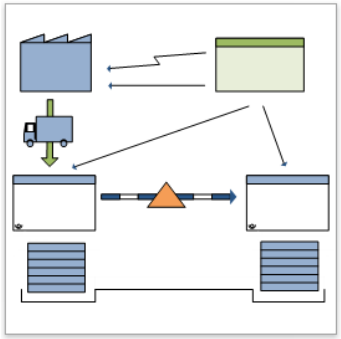
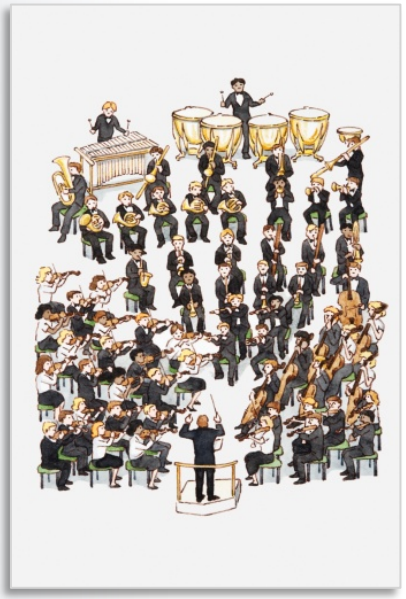
LEAN

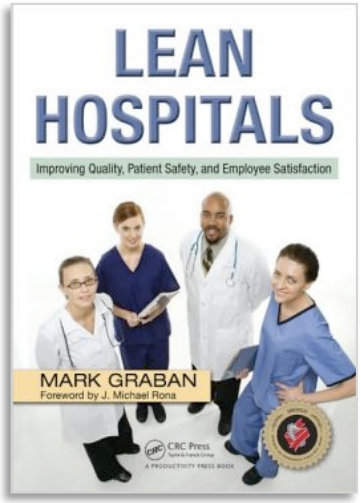




why?
why?
why?
why?
why?

LEAN

- Taiichi Ohno et alii, 1948–1975
- Toyota ProductionSystem (TPS)
- Influence by Deming and Henry Ford
- Lean Hospitals,
  Mark Graban, 2008



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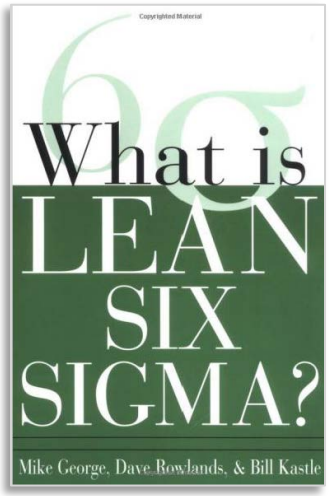
Lean Six Sigma

- Speed of Lean Kaizen
- Quality of Six Sigma
- What is Lean Six Sigma
  Michael George et al., 2003
- accenture



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Laying the Foundation

Basic LEAN Concepts

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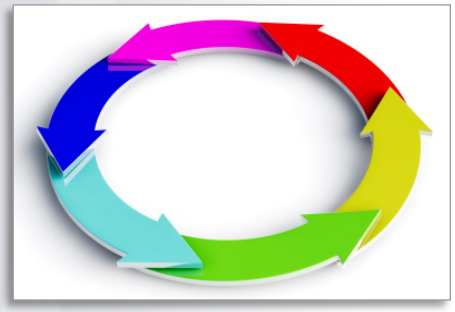
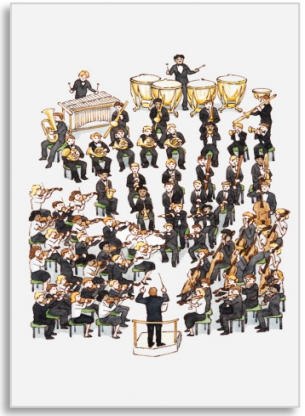
Basic LEAN Concepts

Continuous Flow

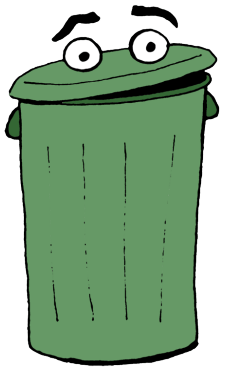


Standard Work

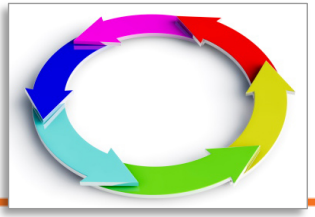


Takt / Cycle / Lead Time

Process Waste



Continuous Workflow

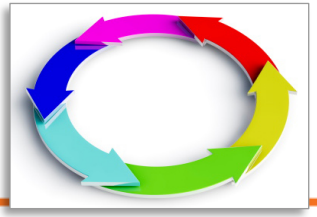


Continuous Workflow

The progressive movement of products through the value stream without stoppage, scrap or backflow

- Strive for Single Piece Flow vs Batch Processing
- Eliminate Inventory (work in progress)
- Eliminate Rework

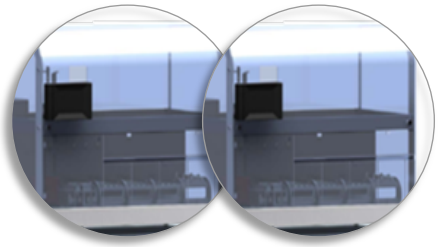
Processing in Large Batches



Delivery

Accessioning

Pre-Analytical

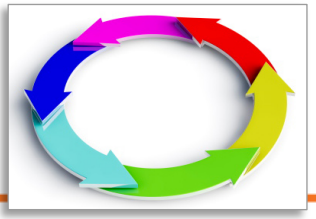


Processing

Imaging

Slide Screening

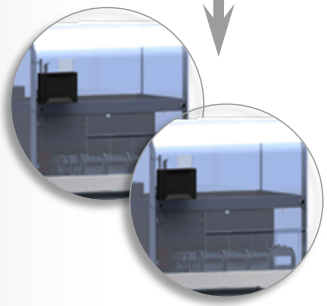
Small Batch Processing



Accessioning

Pre-Analytical

Delivery



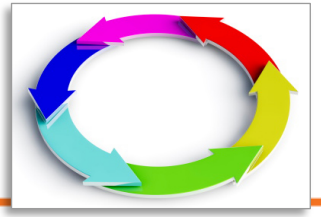
Processing

Imaging

Slide Screening

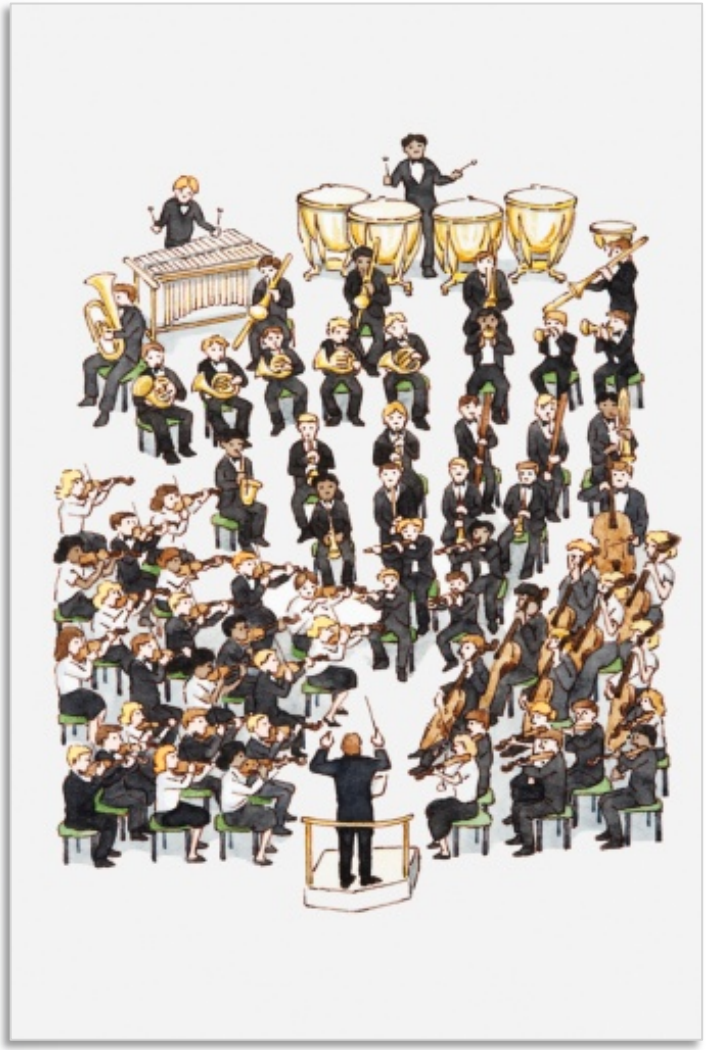
BD

Small Batch Processing

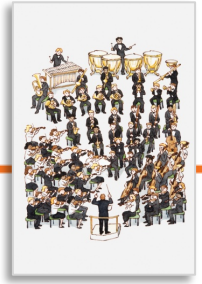


- Decreased lead time
- Less human errors due to reduced stress
- Reduction of staff needed

Standard Work



Standard Work Definition



- Each step in the process should be defined and must be performed repeatedly in the same manner.
- Standard Work will define the most efficient methods to produce product using available equipment, people, and material.
- Standard Work depicts the key process points, operator procedures, production sequence, safety issues, and quality checks.

Standard Work Benefits

- Basis for improvements – exposes problems
- Establishes routine / habit for work to be done
- Reduces maintenance and system down time
- Make scheduling resources easier

Takt Time / Cycle Time / Turn Around Time

Takt Time

Cycle Time

Turn Around Time

Takt Time (TT)

- Frequency to Produce a Quality Slide
- Customer Demand = Daily Workload
- TT = $\frac{\text{Available Time per Day}}{\text{Customer Demand per Day}}$

Cycle Time (CT)

- CT = Total Time required to complete the process
- HOT (Hands On Time)
- WAT (Walk Away Time)
- CT = HOT + WAT

Cycle Time vs Takt Time

Cycle Time =
What we can do

Takt Time =
What we need to do

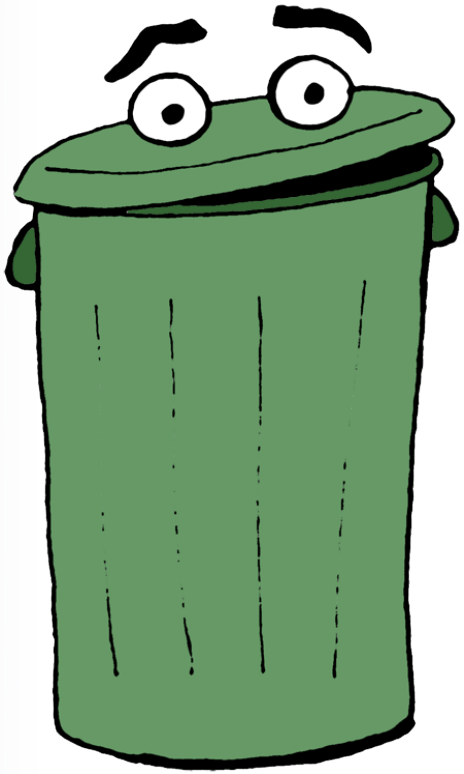
Turn Around Time (TAT)

- Total Process Time including Wait Time
- TAT = Cycle Time + Wait Time

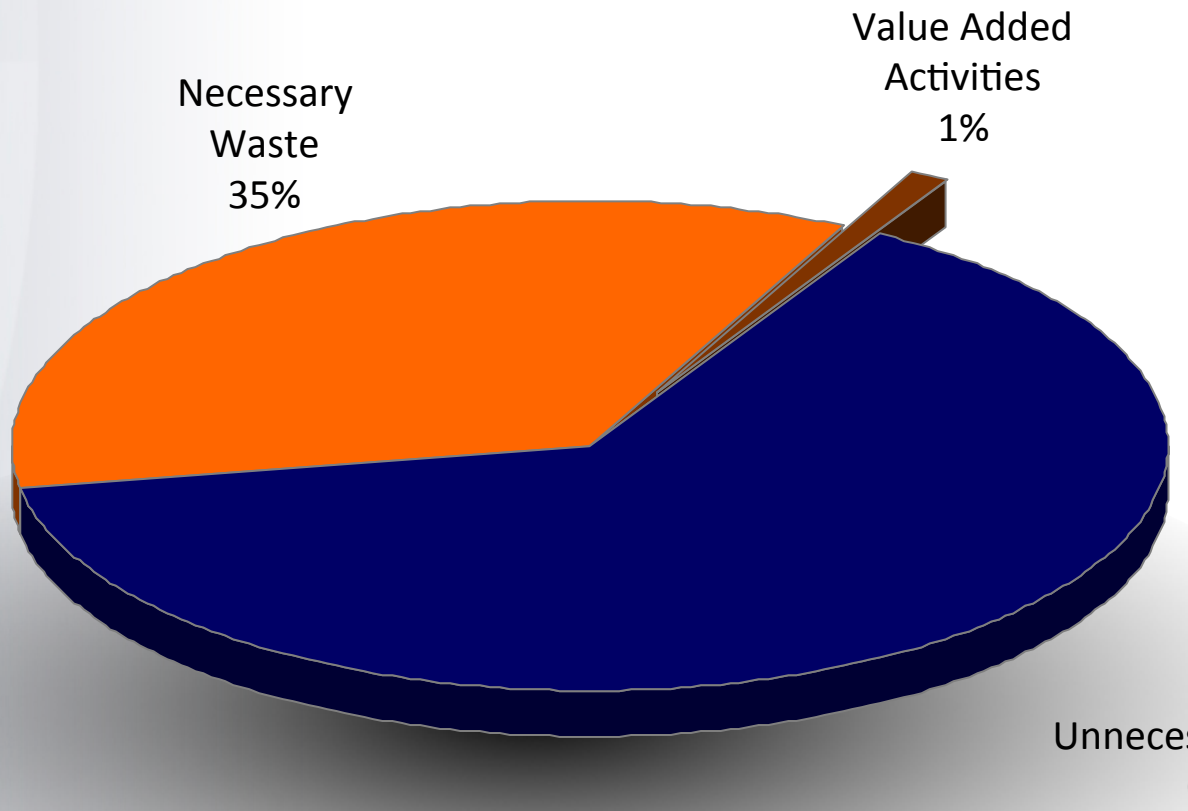
TT / CT / TAT – Benefits

- Base line for improvements
- Identify customer demand (TT)
- Focus what / where to improve
- Measure the impact of process improvements

Process Waste



Value Added vs Non-Value Added activities



Exercise – Somebodies Garage

INVOICE

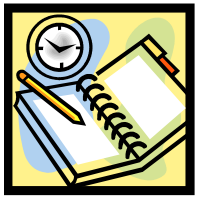
SOMEBODIES GARAGE

Address: _____
Invoice No: _____
Date: _____

Product Item	Description	Time spend (min)	Amount
1	Receiving Customers Car and Keys	10	8$
2	Moving Car into the Repair shop	5	4$
3	Car Inspection	30	25$
4	Looking for Spare Parts	15	12.5$
5	Lunch break	30	25$
6	Rush -Ordering missing spare parts	15	12.5$
7	Calling the customer with a repair estimate	5	4$
8	Waiting for customer to call back	20	17$
9	Starting Repair	30	25$
10	Receiving Rush Order	10	8$
11	Spare Parts	0	350$
12	Finishing Repair	45	37.5$
13	Generating Bill	15	12.5$
14	Car Wash	10	8$
15	Driving Car to Pick-up lot	5	4$
16	Calling customer for pick up	10	8$
17	Explaining Bill to customer	15	12.5$
	TOTAL	270min	573.50$

Signature: _____ Date: _____

LEAN Process Waste



Waiting

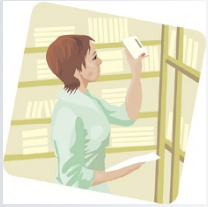
Overproduction

Transportation

Rework/Defects

Intellect

Motion



Inventory

Processing

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Waste Benefits

- Smoother Less Disruptive Process Flow
- Saving Time, Energy and Money

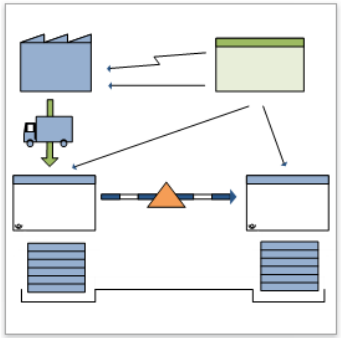
From Concept to Execution

Identifying Improvement Opportunities

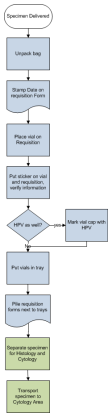
LEAN Toolbox

Kaizen Events

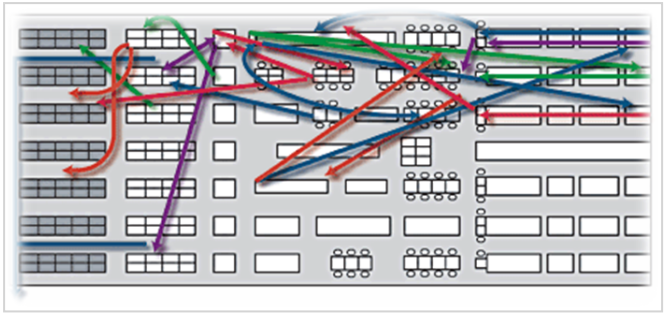
VSM



Process Maps



Spaghetti Mapping



LEAN Toolbox

Kai 改 Change
Zen 善 Good

Kaizen Events - Overview

Kai 改 Change
Zen 善 Good

- Kaizen Events can touch every part of an organization
- 3 – 5 day event
- Executed by a team
- Sponsored executive champion
- Facilitated by a LEAN expert

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Kaizen Events - Elements

Kai 改 Change Zen 善 Good

- Training
- Defining the problem/goals
- Documenting the current state
- Brainstorming and developing a future state
- Implementation
- Developing a follow-up plan
- Presenting results
- Celebrating successes

BD

Kaizen Events - Types

Kai 改 Change
Zen 善 Good

- Value Stream Maps
- Variation Reduction
- Inventory Management - Kanban
- 5S
- Value Selling

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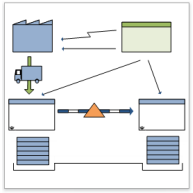
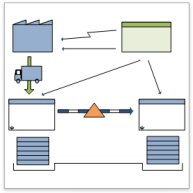
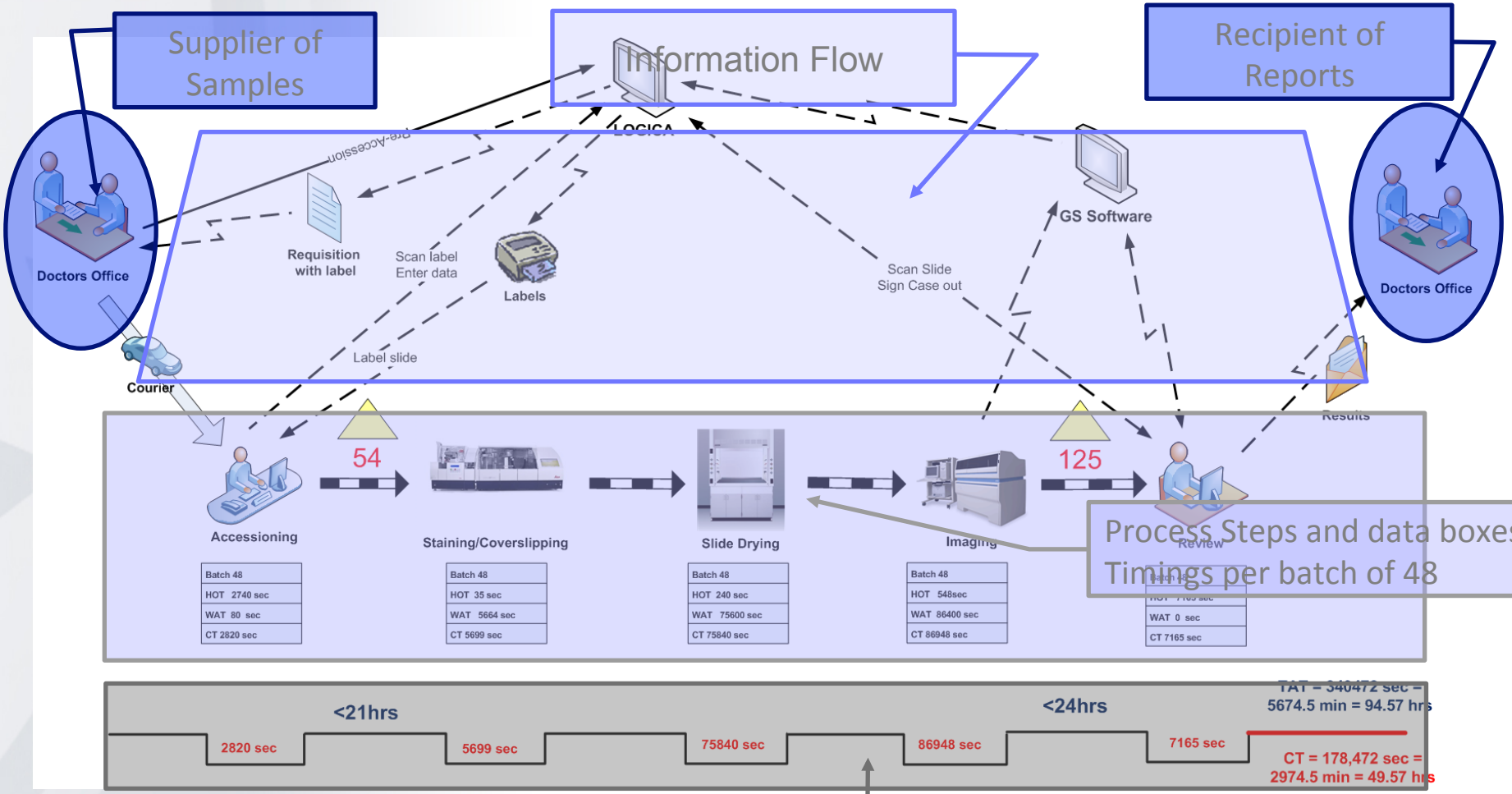
Value Stream Mapping - Overview



- Analytical not a statistical tool
- 20.000ft view of a process
- Documents the entire process and information flow on one page
- “Snapshot in time” – data reflects the day the activities are measured
- Does not improve the process but point out areas to improve

Value Stream Map - *Explanation*





OCT :Operator Cycle Time
MCT : Machie Cycle Time
WT : Wait Time = Time where samples wait for a process step to be performed
CT: Cycle Time = OCT + MCT
TAT: Turn Around Time = CT + WT

Cycle Time and Turn Around Time Calculation

Value Stream Mapping vs. Process Mapping

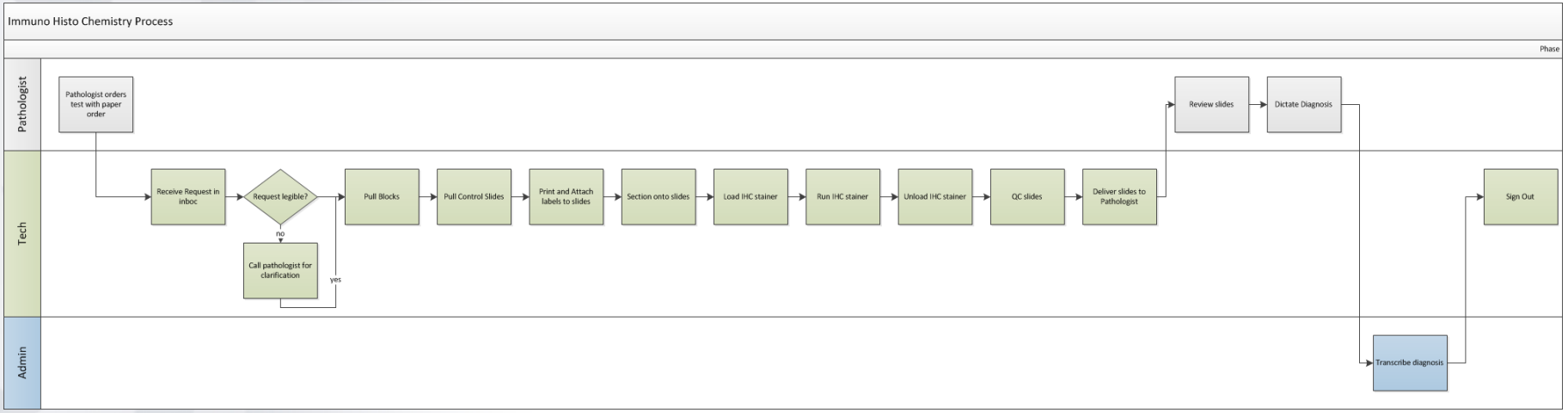
Value Stream Map

50.000ft view of a process

Process Map

Detailed view of a process

Process Mapping - example

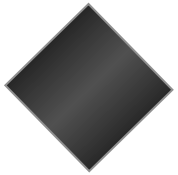


- Process map can flow horizontally or vertically
- Use color coding to distinguish between department or instrumentation

Process Mapping 101

- Start with the input that initiates the process
- Ask the question, “What happens next?”
- Record each step in post-it note boxes flowing left-to-right, or top-to-bottom.

- Insert arrows to show the direction or flow of the process.

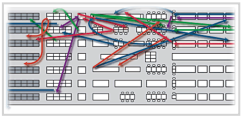


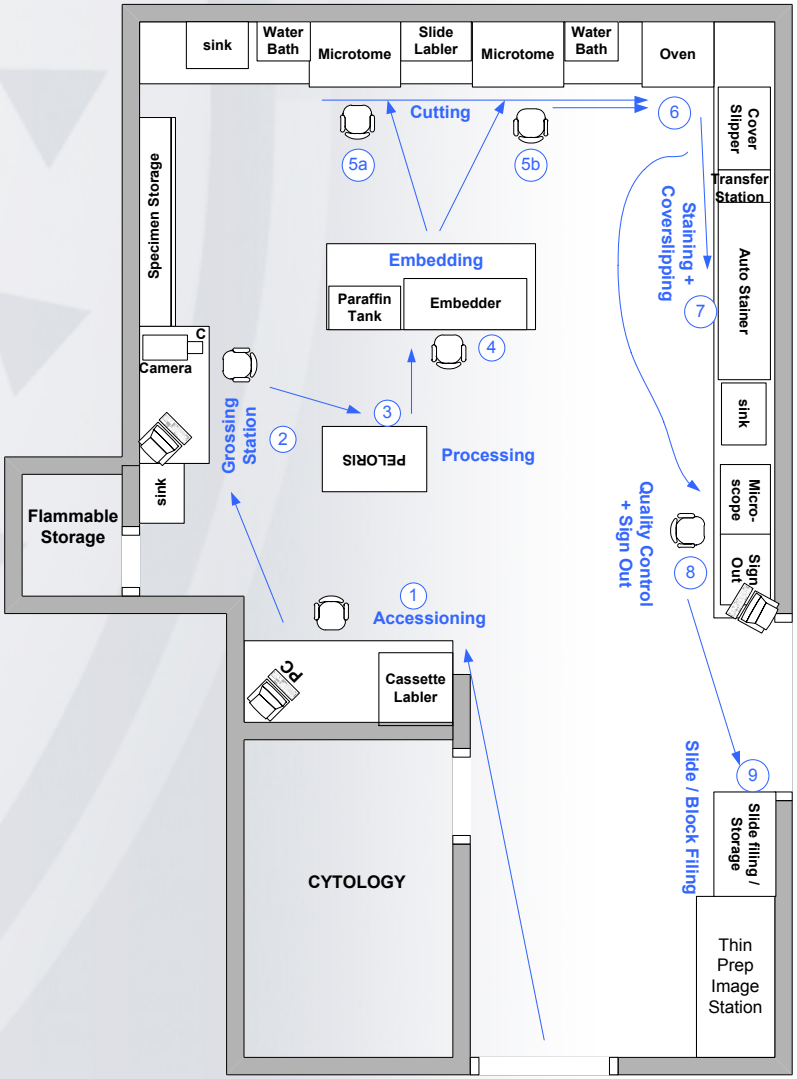
- When the flow can go in two directions, turn the post-it to a diamond for a yes/no question and put in two arrows to show the two directions.

Process Map - Analysis

- Which process steps are value added, which are non-value added?
- Is the process broken?
- How much Operator Cycle Time and Machine Cycle Time is spent executing the process ?
- How many hand-offs are in the process flow – they pose potiential room for errors

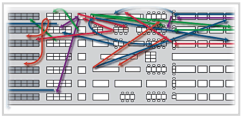
Spaghetti Mapping - Overview



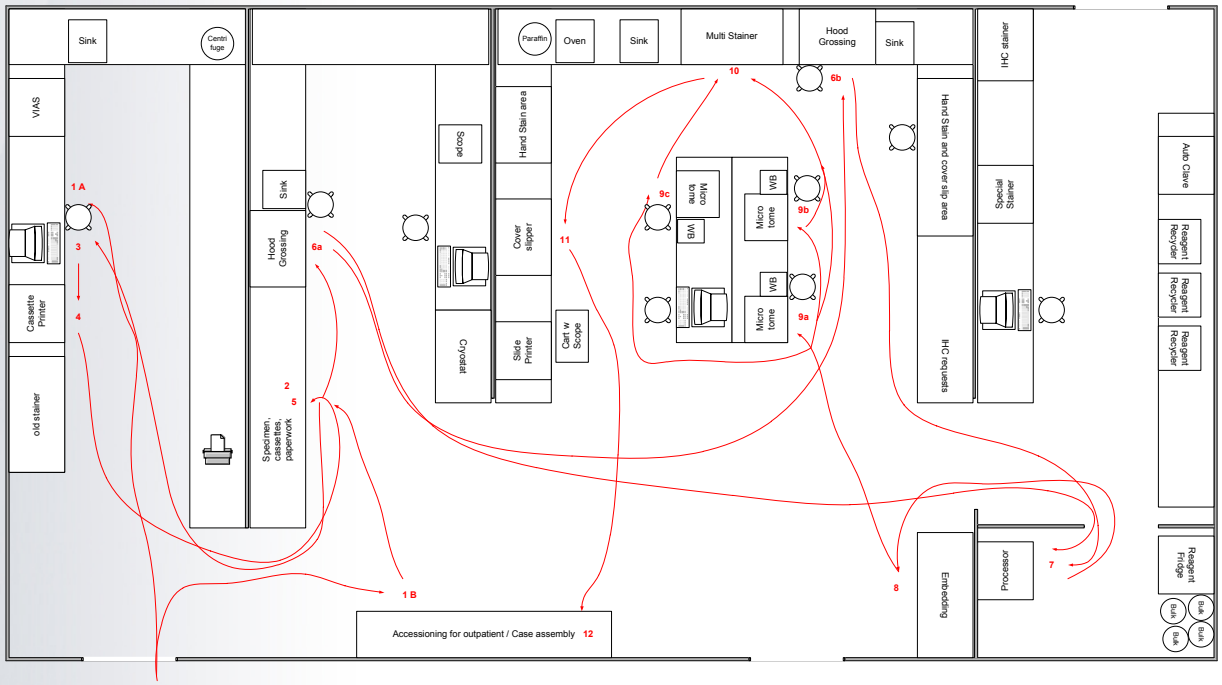


- Depicts the specimen flow throughout the laboratory / facility
- Helps analyzing if the laboratory layout is set up according to the process flow

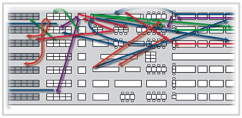
How do create a Spaghetti Map



1. Follow the specimen through the laboratory according to your process flow
2. Mark the movement with numbers on your layout
3. Connect the numbers with lines



Spaghetti Mapping - Analysis



- Does the laboratory layout follow the process flow ?
- Are all consumables stored at Point of Use?
- Does the laboratory have to be re-designed for new equipment?

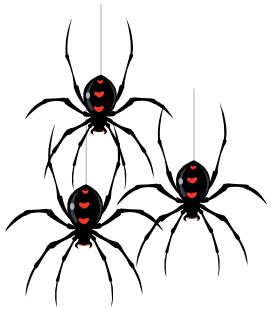
Route Cause and Countermeasure

Brainstorming

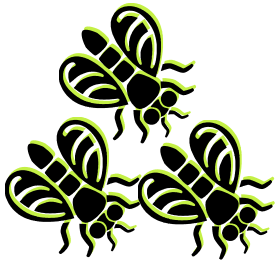
Root Cause Analysis – 5 Why's

WHY?

WHY?



WHY?



WHY?

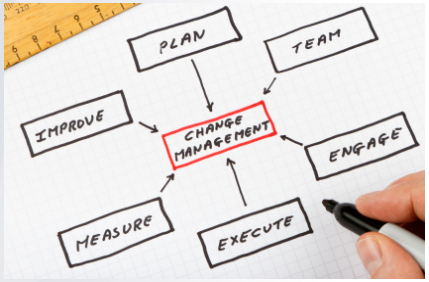
Countermeasure

How to make it Happen

Implementation Tools

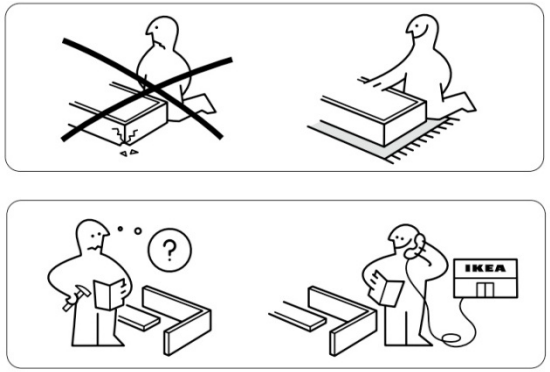
Implementation Tools

Change Management



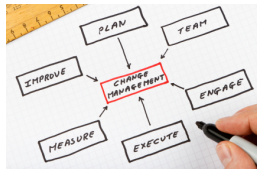
Action Plan

5S



Visual Management

3 Stages of Change

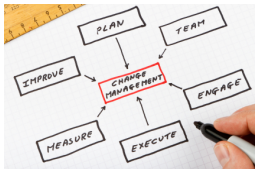


Unfreeze Change Refreeze

3 Stages of Change – Unfreeze

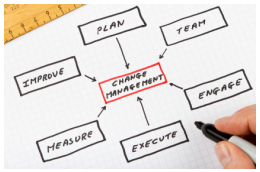
- Determine what needs to change
- Ensure there is strong support from upper management
- Create the need for change
- Manage and understand the doubts and concerns

3 Stages of Change – Change



- Change model
- How people respond to change
- Communicate often
- Dispel rumors
- Empower action
- Involve people in the process

3 Stages of Change – Refreeze



- Anchor the changes into the culture
- Develop ways to sustain the change
- Provide support and training
- Celebrate success!

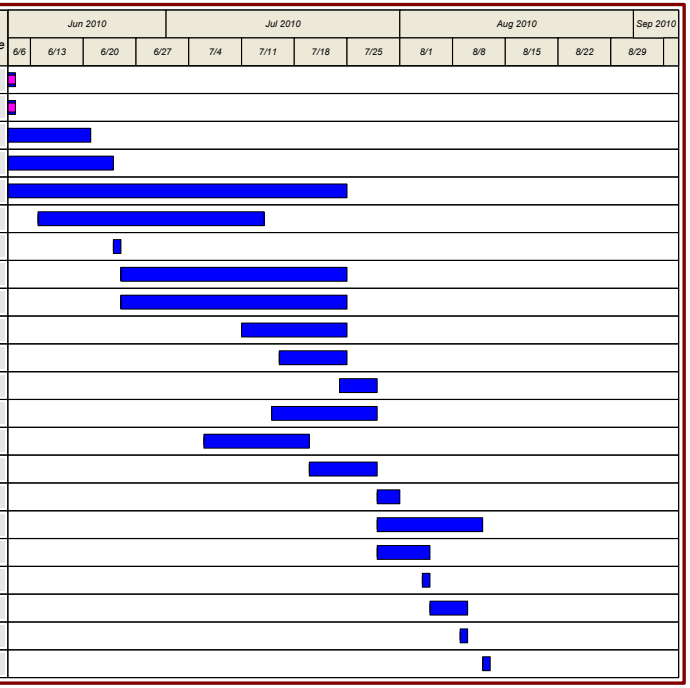
Action Plans - Elements

- W……..
- H……..
- W…….
- W…….
- S…….

Action Plans - Examples

- Excel Format
- Gant Chart
- MS Project

ID	Task Name	Start	Finish	Duration	% Complete
1	Sign Bond maX Reagent Rental Agreement	6/10/2010	6/10/2010	1d	100%
2	Initial Meeting to review lab layout and time-line	6/10/2010	6/10/2010	1d	100%
3	Upgrade LIS – Add AP Module	6/10/2010	6/20/2010	11d	0%
4	Search and hire Histology Supervisor and staff	6/10/2010	6/23/2010	14d	0%
5	PO to Bartels and Stout and lead time to delivery	6/10/2010	7/24/2010	45d	0%
6	Write laboratory procedures - 3rd Party	6/14/2010	7/13/2010	30d	0%
7	On-Site visit to establish workflow and SOP's	6/24/2010	6/24/2010	1d	0%
8	Construction of new lab	6/25/2010	7/24/2010	30d	0%
9	Order lab furniture and fixtures – lead time	6/25/2010	7/24/2010	30d	0%
10	Order remainder of lab equipment with lead time	7/11/2010	7/24/2010	14d	0%
11	Order Supplies with lead time	7/16/2010	7/24/2010	9d	0%
12	Install furniture and equipment in new lab	7/24/2010	7/28/2010	5d	0%
13	Program and test LIS	7/15/2010	7/28/2010	14d	0%
14	Set IHC menu	7/6/2010	7/19/2010	14d	0%
15	Order Bond reagents	7/20/2010	7/28/2010	9d	0%
16	Train on Bond maX	7/29/2010	7/31/2010	3d	0%
17	Perform validation studies on IHC menu	7/29/2010	8/11/2010	14d	0%
18	Train on balance of histology equipment	7/29/2010	8/4/2010	7d	0%
19	Establish and test CAP required reporting (Bond)	8/4/2010	8/4/2010	1d	0%
20	Dry runs – request through delivery of slides	8/5/2010	8/9/2010	5d	0%
21	Internal inspection to CAP guidelines	8/9/2010	8/9/2010	1d	0%
22	Go-Live	8/12/2010	8/12/2010	1d	0%



5S

What is 5S ?

The 5S System

- First step in continual process improvement
- Basic principles of process improvement
- Begins to eliminate waste
- Optimises the workplace
- Is not just about teaching people to be tidy
- Gives people control over their processes
- **REDUCES STRESS!**

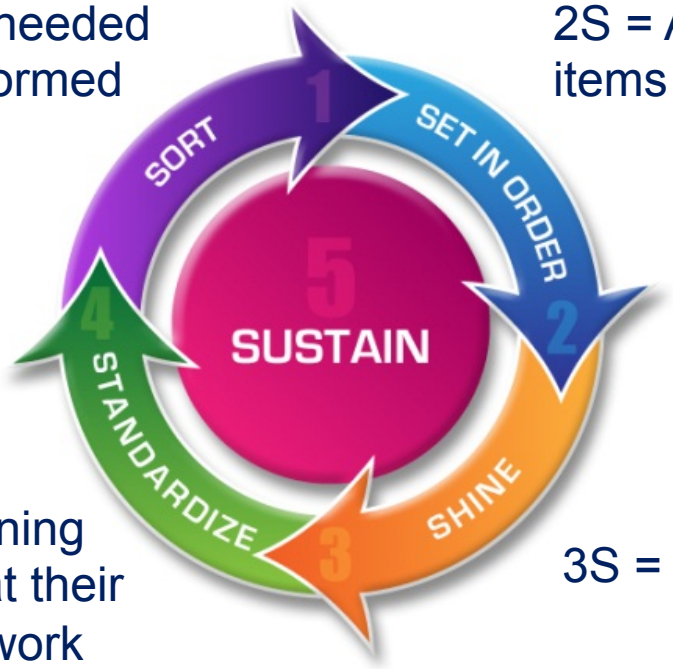
BD

5S - Explained

1S = Identify all items needed for the work to be performed and discard all others

2S = Assign places for all items within the work space

5S = Sustain the new process



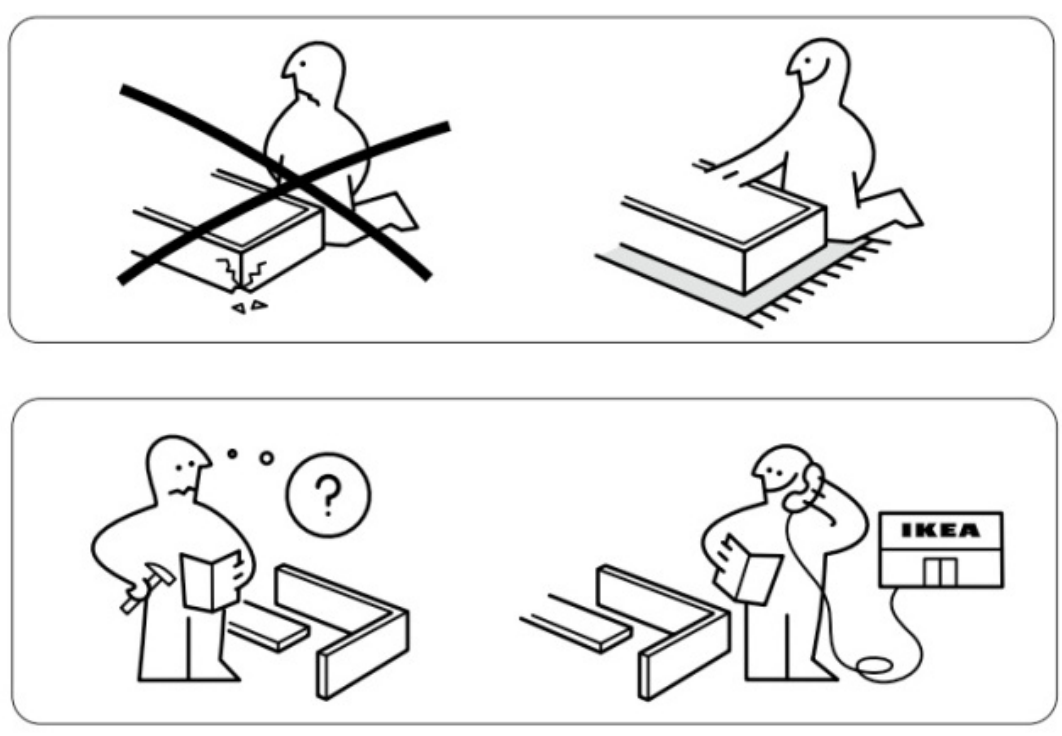
4S = Standardize cleaning and putting all things at their place every day after work

3S = Clean the workplace

5S Benefits

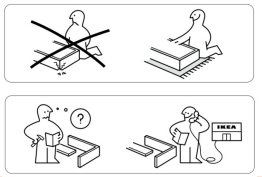
- Improved safety
- Improved quality
- Reduced equipment down time
- Eliminate search time

Visual Management



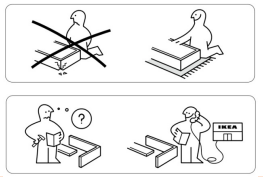
Visual Management allows us to know what is happening when walking into a situation.

Visual Management



- Makes anomalies visible
- Error proofs process
- Improves communication
- Can be used to manage key metrics

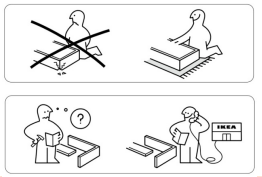
Visual Management – Error Proof



- Use colors and color-coding

- Make it easy to do it right
  - Checklists
  - Effective data collection formats
  - Workflow with fewer hand-offs
  - Symbols

Visual Management Benefits



- Problems can be solved immediately
- Improve distribution of work
- Improved communication in the laboratory
- Key metrics being managed daily

Longterm Success
Process Sustainability

Process Sustainability

- Implement key performance indicators
- Monitor / audit process performance
- Continually improve the process

Leading vs Lagging Indicators

- Lagging Indicators
  - Measure the output of a high level process
  - Measured in larger intervals (monthly)

- Leading Indicators
  - Measure the output of a deeper level process or a single process step
  - Measured in short frequent intervals (daily, weekly)
  - Help to immediately Root Cause and Countermeasure to influence the Lagging Indicators

Process Audit

How?

- Pick the audit methodology
  - Re-observation
  - Interviews
  - Questionnaires

When?

- What is the right frequency

Who?

- Who is in charge of the audit

Summary

Topics Covered

- ✓ Introduction
- ✓ Setting the Stage - Six Sigma vs. LEAN
- ✓ Laying the Foundation – Basic LEAN Concepts
- ✓ From Concept to Execution – Identifying Improvement Opportunities
- ✓ How to make it Happen – Implementation Tools
- ✓ Long-term Success – Process Sustainability

BD

Expectations for this workshop met?

- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....
- ❑ .....

Questions?