Lab Quality Confab 2018

4 Fundamental LEAN Tools to Transform your Laboratory

D'Angelo ADVANTAGE LLC
Creating Quality by Design: "Solving Complex Problems Through Practical Solutions"

Rita D'Angelo, Bonnie Messinger, Bill Krzisnik

Learning Objectives

The Learner will be able to:

1. Understand the 5S method and how to effectively implement the effort in your workplace
2. Understand work rules leading to standardization of tasks for minimization of variation
3. Effective process improvements based on scientific thinking to achieve a continuous improvement environment
4. Identify the routine and adapt the skills necessary to create and sustain a culture of continuous improvement based on small incremental improvements

Definitions

- 5S- A workplace suited for visual control and lean production
- A3- Problem solving is the act of defining a problem; determining the cause of the problem; identifying, prioritizing and selecting alternatives for a solution; and implementing a solution
- Kata- is the practice of daily continuous improvement toward developing systematic problem-solving by innovation, scientific thinking and effective teams
- Standard Work- A precise description of each work activity specifying cycle time, *takt* time, the work sequence of specific tasks and the minimum inventory of parts

5S Workplace Organization
Create a Visual Workplace

5 S Introduction

What is 5 S?	A Lean tool for creating, maintaining, and improving a well organized, clean, safe, and highly productive work area
Where did it originate?	Ford Motor Company created the "original Recipe" for work place organization called 5C: Clear-Configure-Clean-Conform-Custom
How was it adapted?	Toyota adapted this to 5 S: Sort-Set in Order-Shine-Standardize-Sustain
Where to Use?	Any work area
Affects Who?	At every level of the organization in any area or department
How to apply?	Early in the Lean Transformation or the lack of good organization will interfere with benefits accomplished using other Lean tools
Expected results?	5 S will reduce the non-value added time of searching to find items

SORT

WHAT DOES IT MEAN?

- Remove all unnecessary items
- Leave only the bare essentials
- When in doubt, throw it out!

WHY IS IT IMPORTANT?

- Space, time, money, energy, and other resources that can be managed and used most effectively
- Improves communication between workers
- Increases product quality
- Enhances productivity

- WHAT PROBLEMS ARE AVOIDED?
  - Crowded work stations
  - Storage of unneeded items - waste space
  - Time consuming searching for supplies
  - Unneeded inventory and equipment are costly to maintain
  - Excess stock hides production problems

RED TAG

- Distinguish necessary from unnecessary items
- Label all unnecessary items with a red tag so they can be identified as unnecessary and removed
- The remaining necessary items can be organized
- When in doubt remove it

SET IN ORDER

WHAT DOES IT MEAN?

- Arrange items so they are easy use
- Label items so anyone can find them
- Make things visual so items are readily identified when they are out of place of out of stock

SHINE

WHAT DOES THIS MEAN?

- Keep everything swept and clean <u>everyday</u>

- **WHY IS IT IMPORTANT?**
- To create a safe and enjoyable working environment
- Items are ready to use when needed

STANDARDIZE

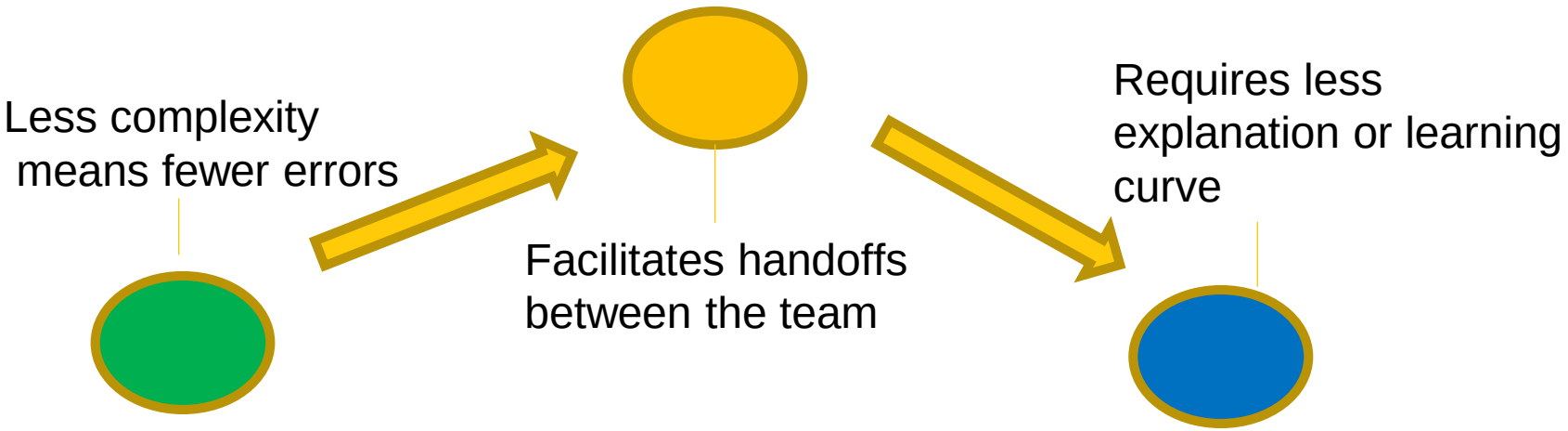
WHAT DOES THIS MEAN?

Integrates:

- Sort
- Set in order, and
- Shine into a unified whole

- **WHAT PROBLEMS ARE AVOIDED?**

- Conditions go back to their old standard
- Work areas are dirty and cluttered
- Areas become disorganized
- Clutter starts to accumulate over time
  - Backsliding occurs



SUSTAIN

WHY IS IT IMPORTANT?

Avoid backsliding

WHAT DOES THIS MEAN?

- Creating a " Way of Life"
- Developing a habit of
- maintaining 5 S procedures

Create a new target, a plan and focus on where you want to be

FORM A TEAM

Audit the Workplace

5S Audits- At the workstation level

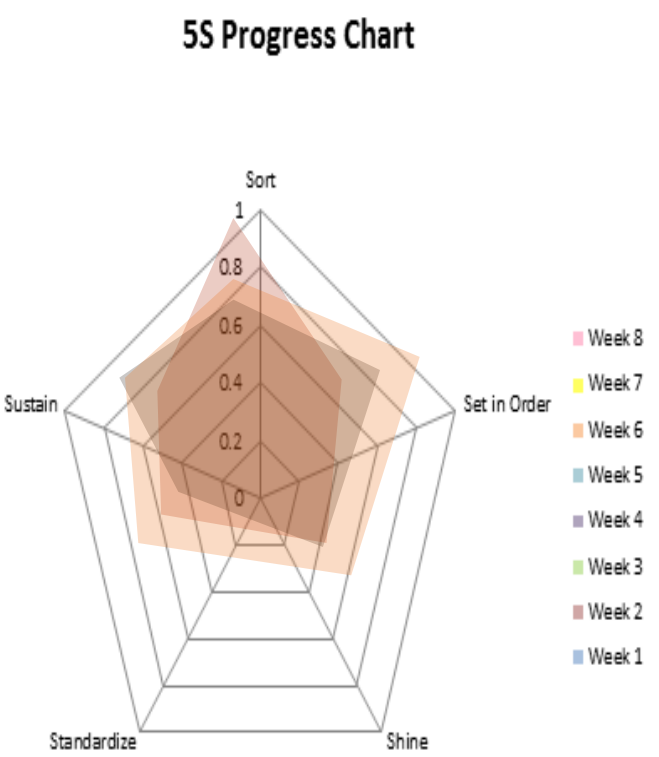
- Provide feedback
- Follow-up with corrective actions
- Managers' and supervisors' responsibility
  1. Perform audits on a regularly (weekly audits are best)
  2. Document and trend
  3. Chart the audit scores on a visual display board, include sort, set and shine

5 S Checklist

Department:	Target Area:
Audit Date:	Auditor:

5S	Principle	Item Description	Observation Score 1 - NO	2 - SOME More than 50% NO	3 - MORE More than 50% YES	4 - YES
SORT	Get Rid of Clutter	Only needed equipment, tools, furniture, office supplies, personal items are present				
		Unneeded/outdated items are removed from walls, bulletin boards, cabinets , equipn				
		Unneeded/expired inventory, supplies, chemicles, parts or materials have been remov				
		Present items are organized and easy to locate				
		Visual controls, signs, tags or labels are present				
SET IN ORDE	A place for everything and everything in its place	Designated location for each time is clearly labeled, defined and obvious				
		Aisle ways, workspaces, equipment locations are clearly identified				
		Missing items are immediately apparent				
		Items are labeled and placed in deisgnated locations				
		Maximum and minim um quantity limits are indicated and obvious				
SHINE	Clean it up and keep it clean	Floors, walls, stairs, countertops, and surfaces are free of dirt, clutter and unneeded i				
		Equipment is kept clean and is free of dirt or contaminants				
		Cleaning materials are easily accessible and spills are cleaned immediately				
		Visual controls, labels, signs, etc are clean and legible				
		Cleaning and maintenance are performed regularly and as needeed				
STANDARDIZ	Set standards of organization	Responsibilities are assigned and understood				
		Standards for organization are known and visibile or available				
		Checklists are available for cleaning and maintenance tasks				
		All quantities and limits are easily recognizeable				
		All commonly used items can be located in 30 seconds or less				
SUSTAIN	Stick to the rules	Standards are in place and are known to the employees				
		Only needed items are located in the area				
		Items are put away immediately after use				
		The area is clean orderly and free of clutter				
		Needed items are located or ordered when minimum quantity is reached				

Progress



Bonnie Messinger, (2018)

A Clean Workplace is a Safe Workplace

Before 5S

HF Pathology, (2013)

After 5 S

Before

After

Exercise

Breakout

1. Identify an area to begin your workplace organization
2. Develop a schedule to include tasks, areas and assign workers
3. Set a date
4. Take pictures for before and after documentation
5. Leadership leads the effort!

5S - IMPLEMENTATION

SORT

- Workplace layouts
- Desks, equipment positioning
- Documents, materials positioning
- Storage systems
- Removal all unnecessary items

STRAIGHTEN

- Functional storage units
- Establish filing systems
- Control (White) Boards
- Labels, colour-coding of files, boxes, areas

SHINE

- Cleaning all surfaces, workstations, equipment, cupboards, work and customer areas
- Demonstration of cleaning as a means of inspection

STANDARDS

- Draft standards, checklists, policies and procedures
- Establish rules, codes of conduct, responsibilities
- Set routines for inspection

SUSTAINMENT

- Involve the whole team including senior management
- Assign responsibilities and practice accountability
- Conduct inspections as routine management practice
- Motivate and reward good 5S practice

At the End of this Module you should be able to do the following:

1. Be educated in 5S, why, what and how
2. Schedule 5S exercises that sustain
3. Document weekly compliance on the checklist
4. Audit for compliance

Before implementing 5S

Reference:
(Lista International Corporation, USA 2012)

Standard Work

Guard against slipping back into old habits

Propel you toward the next improved condition

Standardized work without kaizen

- Kills motivation and wastes creativity
- Repeat problems remain unidentified and unresolved
- Work moves toward entropy and stagnation

Kaizen without standardized work

- Change is chaotic—one step forward, two steps back
- Root causes are not discovered and exploited for improvement
- Can't know if a change was for better or for worse

Standards

Standard Work: a function of

- timing (takt time, cycle time)
- sequence (flow, layout, man/machine interface)
- work in process (materials, parts, information required to carry out the task)

Work Standards: established specifications for quality, time and cost.

Standards

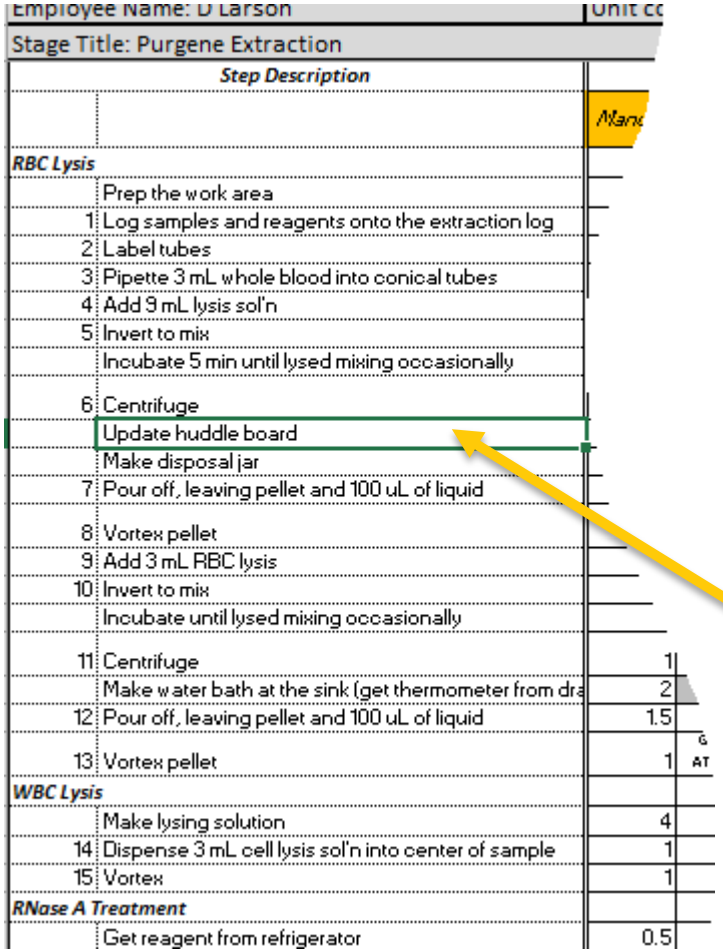
Standardization

- Routine
- Baseline
- Foundation for PDCA

Commonization or Best Practice

- Work done in exactly the same way each time it is performed
- The subject of training, work instructions or SOPs

Standard Work Combination Sheet



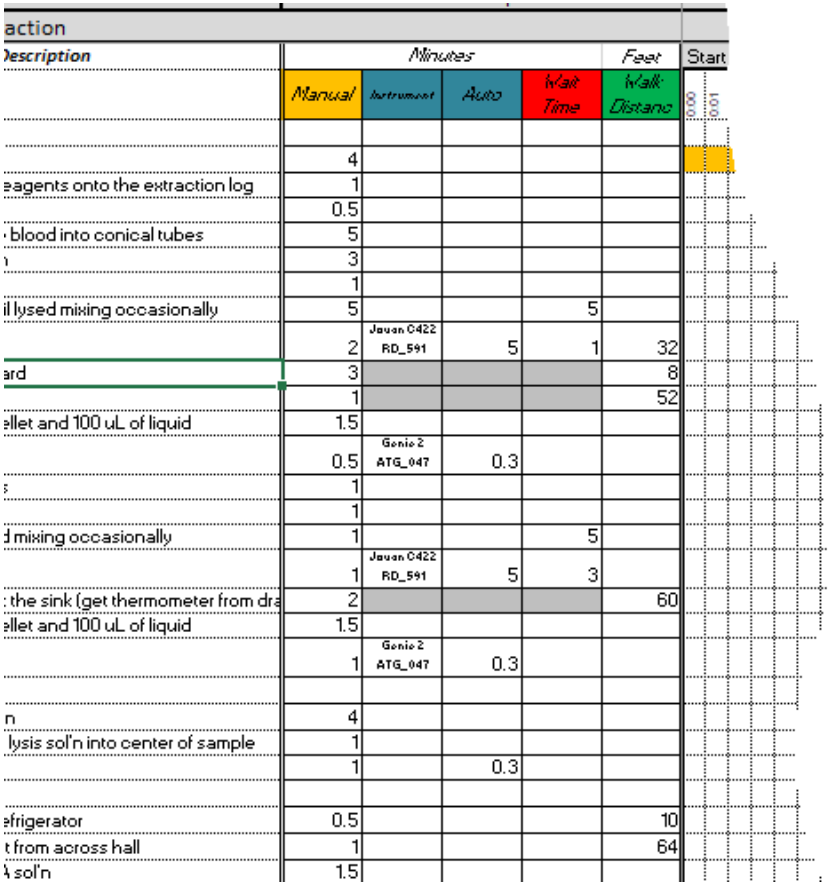
Employee Name: D Larson | Unit cc

Stage Title: Purgene Extraction

	Step Description	Nanc
RBC Lysis		
	Prep the work area	
1	Log samples and reagents onto the extraction log	
2	Label tubes	
3	Pipette 3 mL whole blood into conical tubes	
4	Add 9 mL lysis sol'n	
5	Invert to mix	
	Incubate 5 min until lysed mixing occasionally	
6	Centrifuge	
	Update huddle board	
	Make disposal jar	
7	Pour off, leaving pellet and 100 uL of liquid	
8	Vortex pellet	
9	Add 3 mL RBC lysis	
10	Invert to mix	
	Incubate until lysed mixing occasionally	
11	Centrifuge	1
	Make water bath at the sink (get thermometer from dra	2
12	Pour off, leaving pellet and 100 uL of liquid	1.5
13	Vortex pellet	1
WBC Lysis		
	Make lysing solution	4
14	Dispense 3 mL cell lysis sol'n into center of sample	1
15	Vortex	1
RNase A Treatment		
	Get reagent from refrigerator	0.5

1. Using an SOP, list all the steps in the current process
2. Observe and compare three or more people as they perform the process
3. Insert any tasks that are interleaved into the process steps

Standard Work Combination Sheet



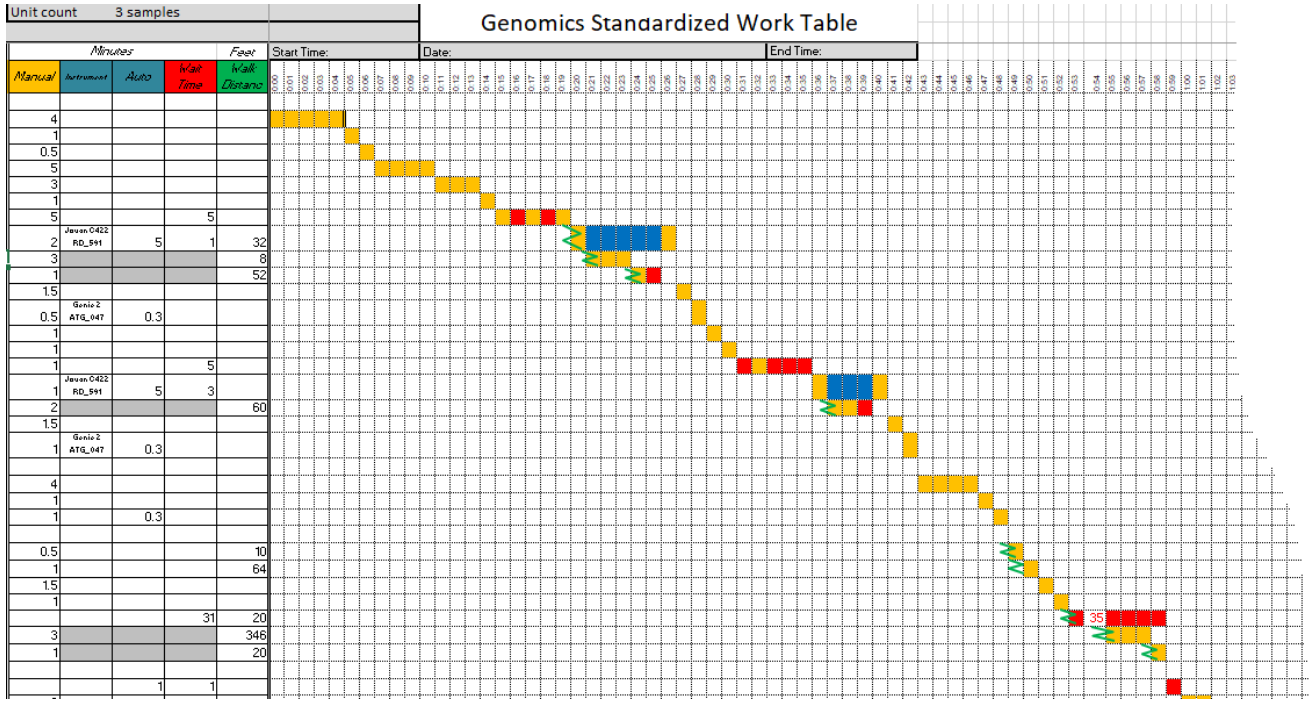
action						
Description	Minutes				Feet	Start
	Manual	Instrument	Auto	Wait Time	Walk Distance	
	4					
eagents onto the extraction log	1					
	0.5					
blood into conical tubes	5					
	3					
	1					
il lysed mixing occasionally	5			5		
	2	Jovan C422 RD_591	5	1	32	
ard	3				8	
	1				52	
ellet and 100 uL of liquid	1.5					
	0.5	Genie 2 ATG_047	0.3			
	1					
	1					
d mixing occasionally	1			5		
	1	Jovan C422 RD_591	5	3		
the sink (get thermometer from dra	2				60	
ellet and 100 uL of liquid	1.5					
	1	Genie 2 ATG_047	0.3			
n	4					
lysis sol'n into center of sample	1					
	1		0.3			
efrigerator	0.5				10	
t from across hall	1				64	
A sol'n	1.5					

4. Record …
   - time for manual steps
   - automated steps
   - wait time
   - distance traveled

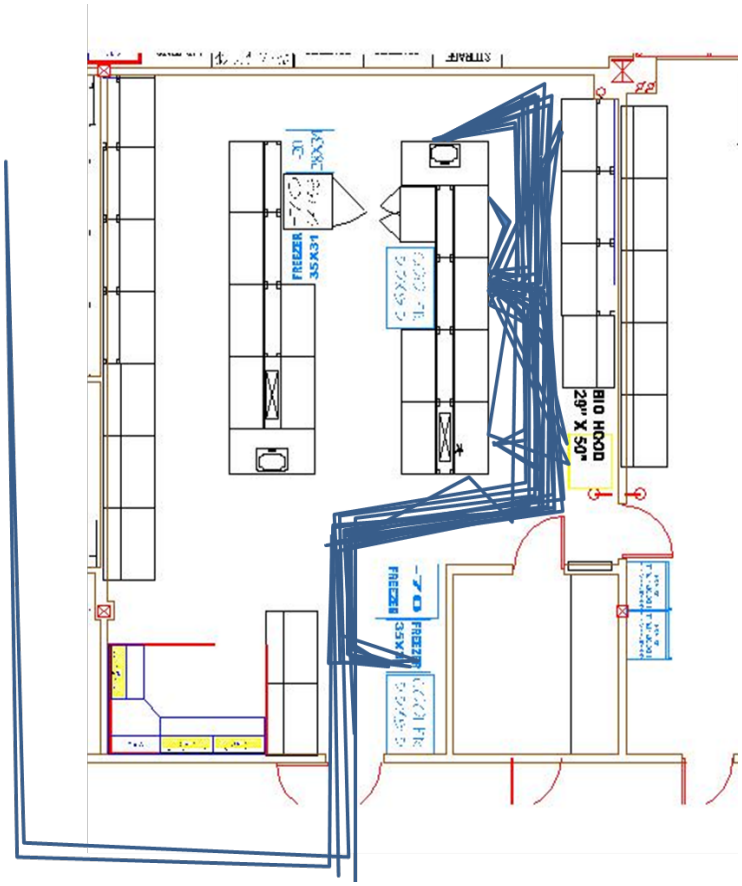
   NOTE: be sure to include time and distance for tasks interleaved into the above steps

Standard Work Combination Sheet

5. Plot all activities on the time chart. Color code each time block



Spaghetti Diagram

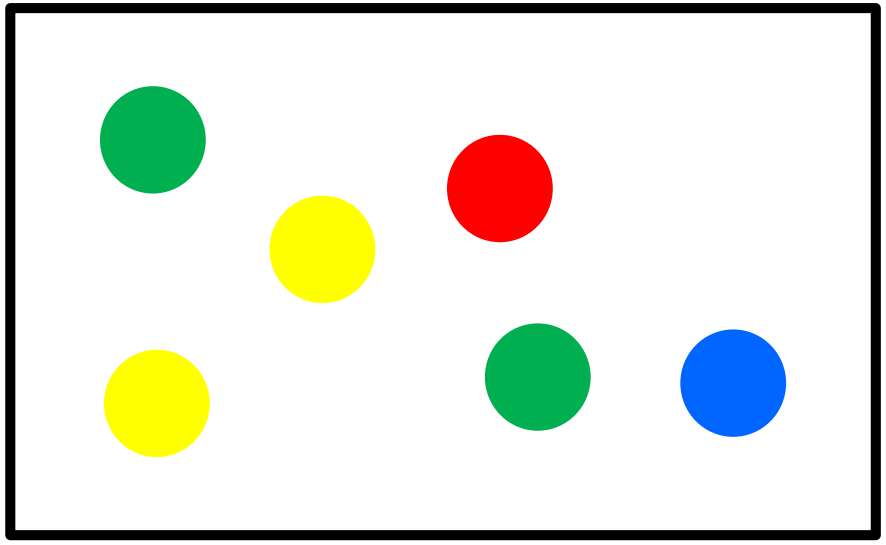


6. Create a spaghetti diagram of the distance traveled

Identify Waste

7. Transfer all of the information collected to your VSM and evaluate where non-standard work creates waste
8. Agree on a standard work practice and implement for an agreed-upon period of time—practice the new standard
9. Discuss the outcome and make adjustments

Dot Game – Final Product



Measures:

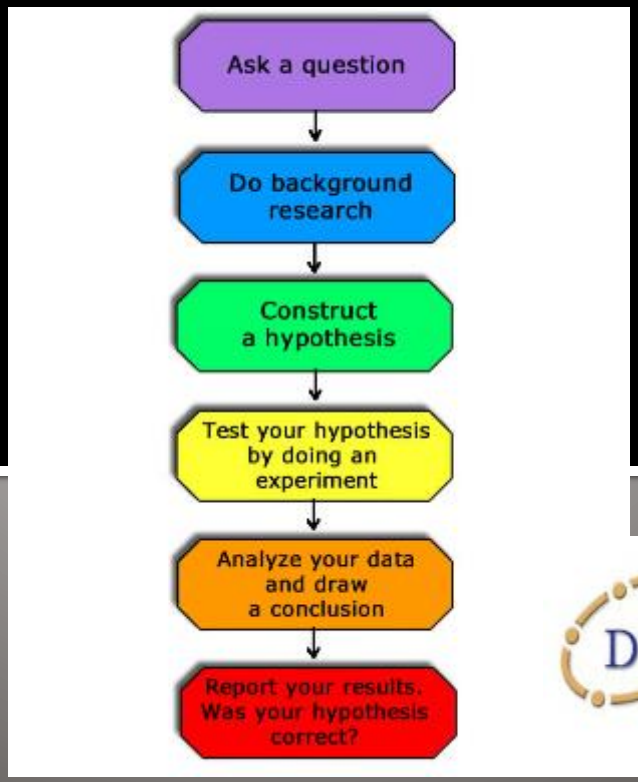
- Time to first piece
- Number of pieces accepted

Typical Lean Tools

- Point of Use Storage (*POUS*)
- Quality at the Source (*QS*)
- Agile Supply Chain
- Pull System (*Kanban; JIT*)
- Templates and Job Aids (*Visual Factory*)
- Reduced Batch Sizes (*Single-piece Flow*)
- Mistake-proofing (*Poka Yoke*)
- Optimal Flow (*Cellular Design, Takt Time, Load Leveling*)

A3 Writing

Scientific Problem Solving



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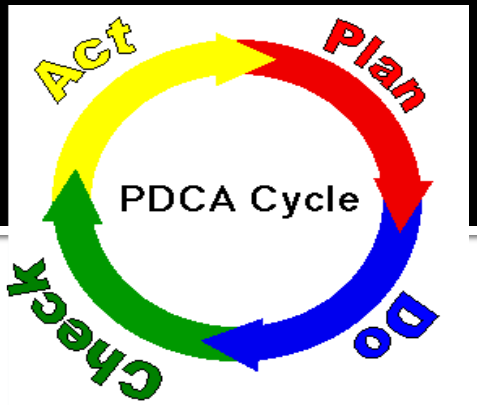
OBJECTIVES



The Participants will be able to:

- Construct an A3 diagram
- Understand the logic
- Perform problem solving with PDCA cycles
- Identify each element
- Understand the data to be collected

- **Exercise:** Each team will perform the following:
- Choose a team leader
- Present the A3 Report to the group

What is an A3?

- Problem-Solving, like telling a story
- Vital information- problem/data/solution
- 11x 17 size, communicated by fax
- Team based problem solving using
  - (Plan-Do-Check-Act) cycles
- Primarily a communication tool that also manages & standardizes the processes

Liker JK. The Toyota Way Field Böök: A Practical Guide for Implementing Toyota's 4P's. McGraw-Hill; 2006.

Core of an Improvement Process

What changes are desirable?

What is most important to this organization?

What data is available?

Carryout the change

Decided by the team

On a small scale (Pilot)

Observe the

effects of the pilot

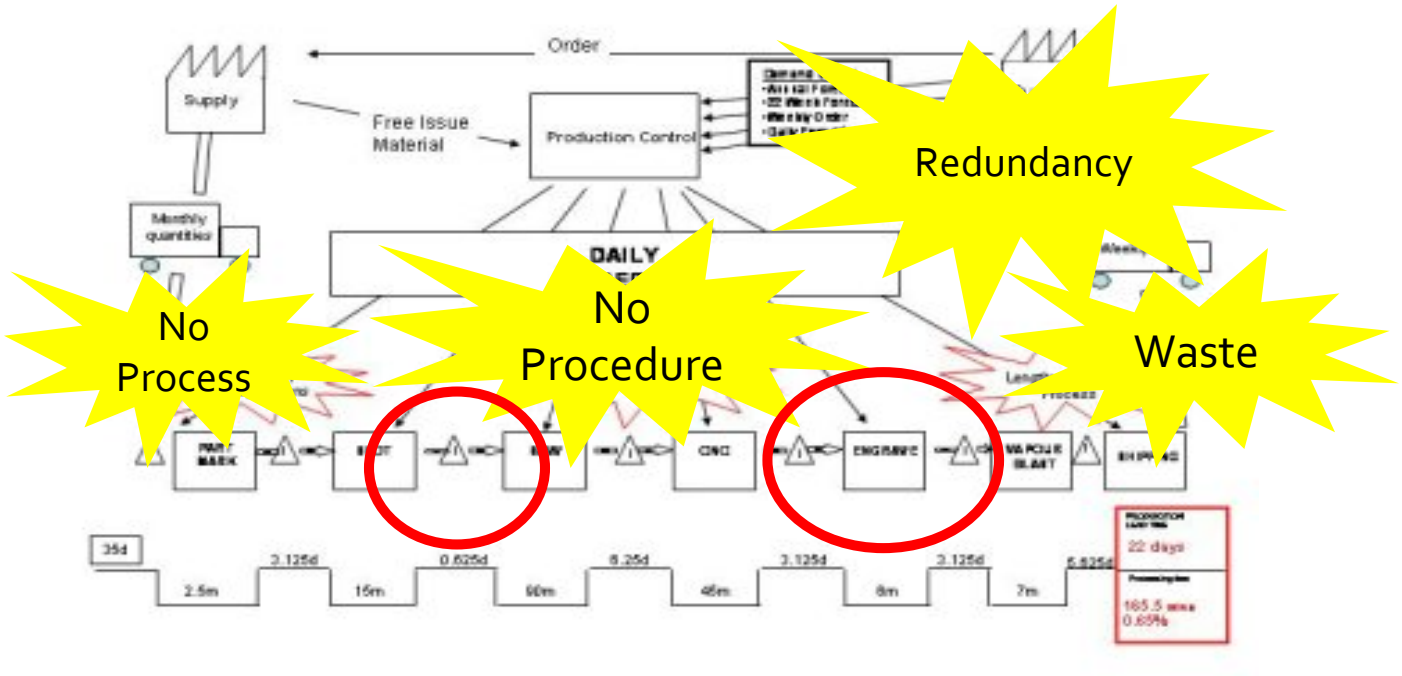
Study results

What did we learn?

What can we predict?

Action Items/Opportunities/Kaizen Bursts

Step elimination & opportunities for improvement



A 3 Report

A3 Title and Date

Team Name:

Problem Background

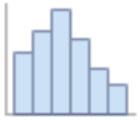
- State the problem
- Narrow down to specifics

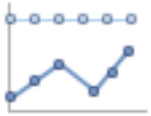
Hypothesis

- What is your educated guess about the problem?

Current Condition

- What are the current situation or baseline facts?
- **Collect simple data**, go to the gemba
- Analyze collected data to show current situation

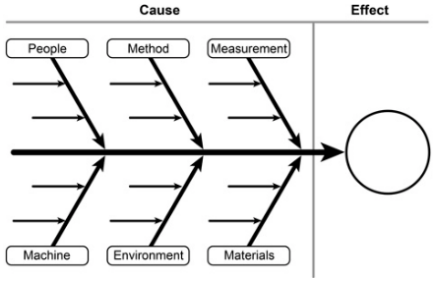




Problem Analysis

- What is the root cause of this problem?
- Ask "why" 5 times
- Fishbone analysis

Why did the defect Occur?
Cause(s)
Why did the cause's exist?
Underlying Cause's
Why did this exist?
Underlying Cause's
Why did this exist?
Underlying Cause's
Why?
And so on



Way things happen now – Current State

Target Condition – Desired state

- What outcome is needed to achieve the goal?
- What % improvement from first round of PDCA?

Corrective Action/Implementation Plan

- Develop and agree on new plan of action
- Is root cause considered to prevent defect from re-occurring
- Get consensus, train, assign Implementation plan:

Specific Task	Who	By When	Date Completed
Education in sp	Team leader- SP	Due Date	Completed date
Education in Rad	Team leader- Rad	Due Date	Completed date
Print visual stickers	SP- Accessioner	Due Date	Completed date

- Test the effectiveness of new plan
- Recollect **same data points and compare with "Current Condition"**
- Target condition reached?? If not another PDCA

Long term Effectiveness check

- Design metrics to monitor over time
- Focused Audits

Standardize the Process

- Standardize the process to ensure it is built into the fabric of the organization – policy, procedures, job aides

The better way of work – Ideal State

A 3 Report

A3 Title and Date

Team Name:

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- State the problem
- Narrow down to specifics

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Standardize the Process

- Standardize the process to ensure it is built into the fabric of the organization – policy, procedures, job aides

Way things happen now – Current State

The better way of work – Ideal State

Problem Background

- State the problem
- Narrow down the problem down to a specific issue
- Research background information understanding
- What was the error or problem that occurred?

How do we do this?

- Communicate & brainstorm with staff that do the work
- Work with your internal/external customers
- Clearly understand the request of the customer

Current Condition

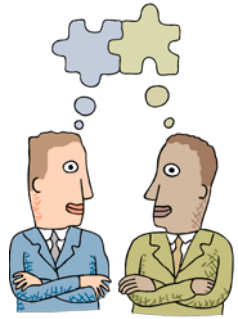
- What is the baseline? Where are we?
- Collect data: what does the date show?
- Analyze and prioritize the starting point

How do we do this?

1. Diagram the process according to what was actually done
2. Use maps to demonstrate pathways, flow of information
3. Use simple data techniques to document current situation
4. All affected/involved must collect data

Problem Analysis

- What is the cause –and-effect relationships of the problem?
- Is it an actual cause or a symptom?
  - Identify the root causes
  - Prevent the reoccurrence-Countermeasure



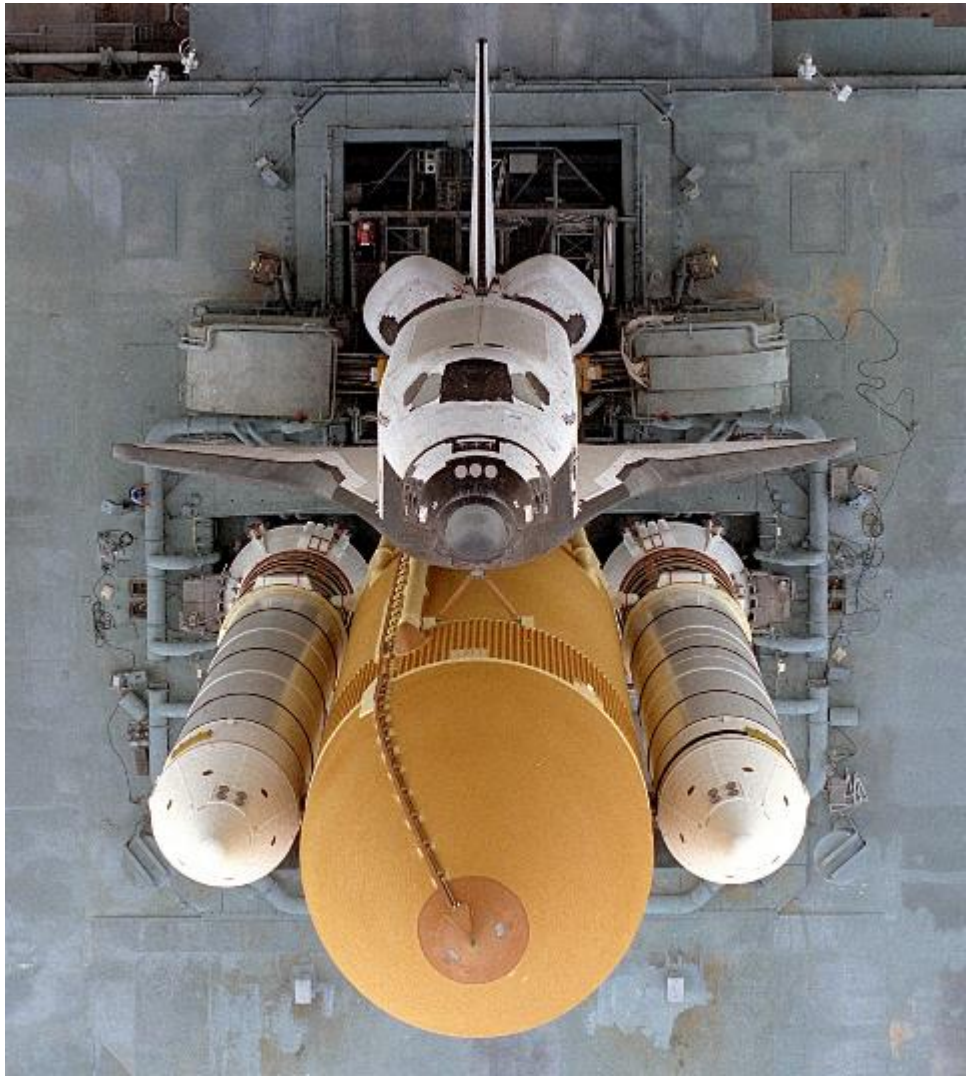
<u>Root Cause Analysis: How do we do this?</u>

By 5 Why's and Fishbone diagram

5 Why's

Why ask Why?

Why?



Why?

Why?

Why?

Why?

Why?

Why?

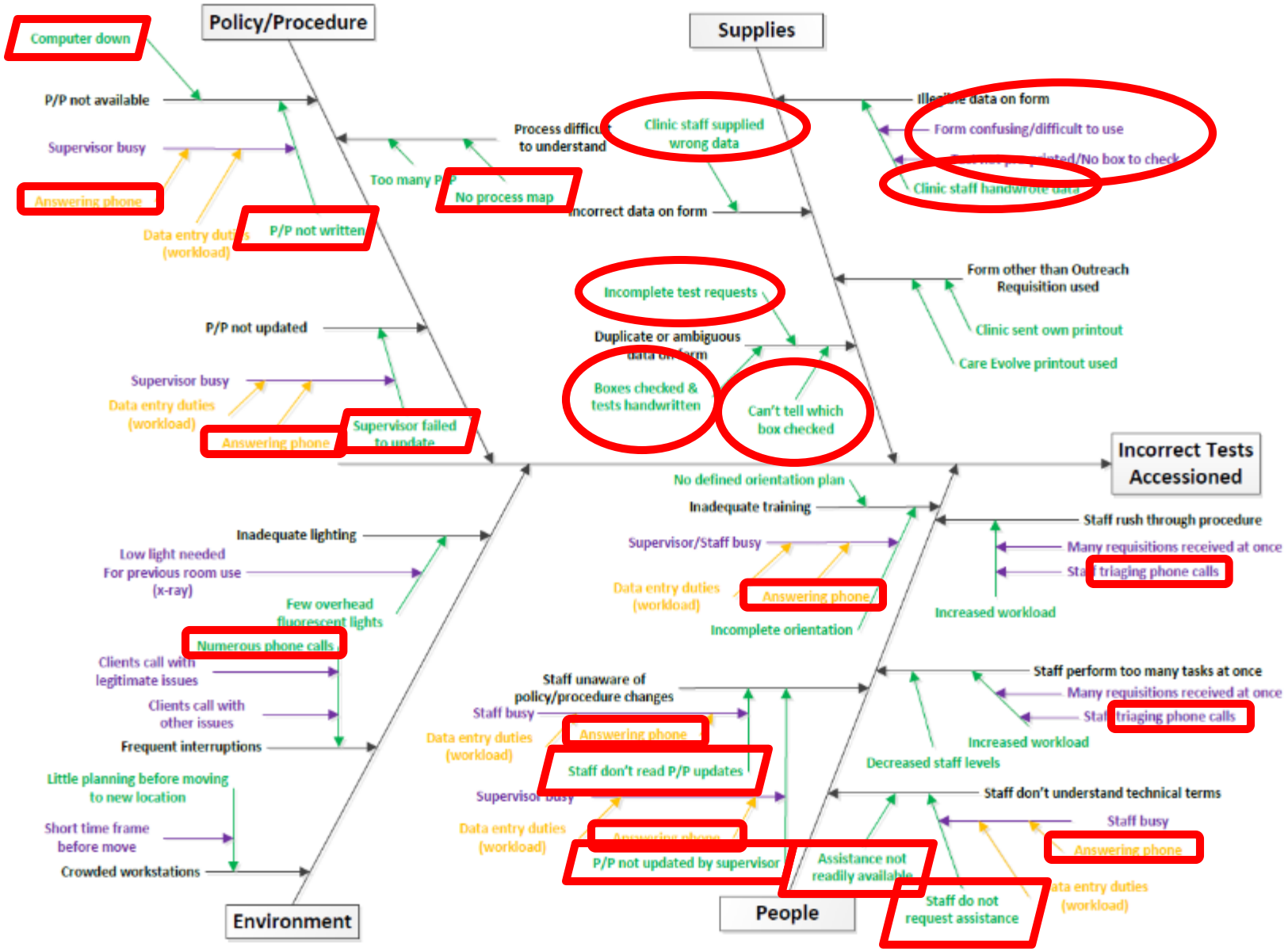
Why?

And now you know

Bonnie Messinger
ARUP Laboratory

5 Why’s

“How To”


Incorrect Tests Accessioned
Policy/Procedure
Supplies
People
Environment
Computer down
P/P not available
Supervisor busy
Answering phone
Data entry duties (workload)
P/P not written
Too many P/P
No process map
Process difficult to understand
P/P not updated
Supervisor busy
Data entry duties (workload)
Answering phone
Supervisor failed to update
Inadequate lighting
Low light needed For previous room use (x-ray)
Few overhead fluorescent lights
Numerous phone calls
Clients call with legitimate issues
Clients call with other issues
Frequent interruptions
Little planning before moving to new location
Short time frame before move
Crowded workstations
Clinic staff supplied wrong data
Incorrect data on form
Illegible data on form
Form confusing/difficult to use
Clinic staff handwrote data
Incomplete test requests
Duplicate or ambiguous data on form
Boxes checked & tests handwritten
Can't tell which box checked
Form other than Outreach Requisition used
Clinic sent own printout
Care Evolve printout used
No defined orientation plan
Inadequate training
Supervisor/Staff busy
Data entry duties (workload)
Answering phone
Incomplete orientation
Staff rush through procedure
Many requisitions received at once
Staff triaging phone calls
Increased workload
Staff unaware of policy/procedure changes
Staff busy
Data entry duties (workload)
Answering phone
Staff don't read P/P updates
Supervisor busy
Data entry duties (workload)
Answering phone
P/P not updated by supervisor
Staff perform too many tasks at once
Many requisitions received at once
Staff triaging phone calls
Increased workload
Decreased staff levels
Staff don't understand technical terms
Staff busy
Answering phone
Assistance not readily available
Staff do not request assistance
Data entry duties (workload)

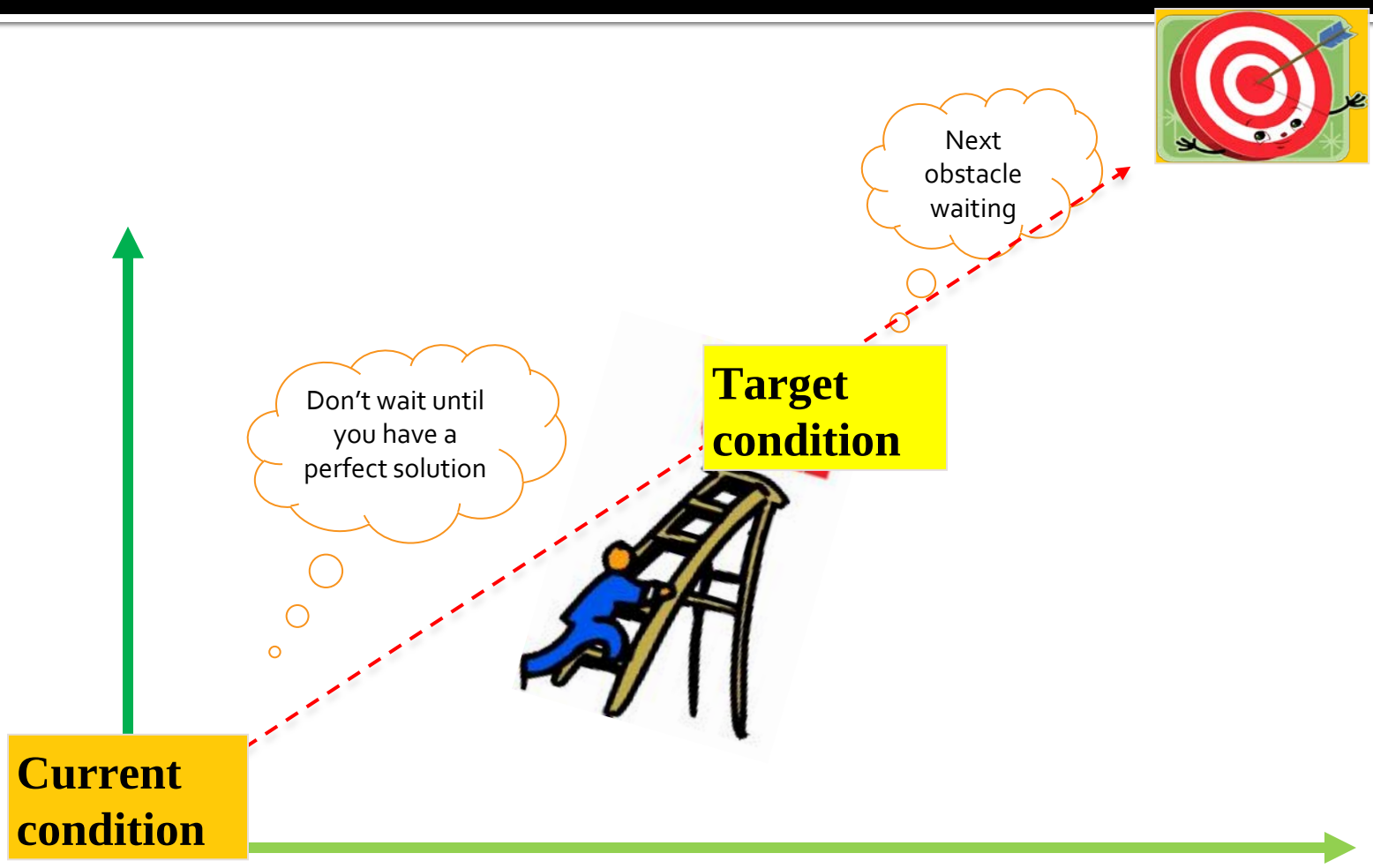
Target Condition

- Can the process be improvement to prevent error?
- With team consensus agree on a new/revised process
- Identify the perfect process

<u>How do we do it?</u>

1. Design an efficient process
2. Have we met the customer requirement?
3. Is this plan reasonable?

Working Towards the Target



Action Plan

- Develop steps for the new plan by team consensus
- Does the plan make sense
- Consider all areas affected by the (upstream & downstream effects)
- Was the root cause considered?

Implementation Plan

- Roll out the New Plan- "Action Plan" as a pilot
- Assign responsibility to implement the plan. who ? When ? Where? Get consensus & train all involved
- Test the effectiveness of new plan
- Recollect same data points and compare with "Current Condition"
- Did we reach the outcome set in the "Target Condition"?
- If not, repeat PDCA

<u>Consider</u>

1. Who and when to implement the new plan
2. Ensure supervisor involvement and feedback
3. Educate all members involved in the process

Implementation Plan

	Implementation Plan			
	Specific Task	Name of Team Member	Date/Time Expected	Date Completed
1				
2				
3				
4				
5				
6				
7				

A 3 Breakout

Exercise: Each team will perform the following:

- Choose a team leader
- Complete the A3
- Present the A3 report to the group
- Ensure data collection is considered

Improved Dot Production

- Each team will present a change to the dot production process.
- The changes will be designed into the new standard.
- Round 2 will be compared to Round 1
  - 1) Time to first piece
  - 2) Number of completed and accepted units

Questions?

What is a KATA?

Kata (literally: "form") is a Japanese word that refers to detailed choreographed patterns of movements practiced either solo or in pairs

Kata are used in many traditional Japanese arts but are most commonly associated with the martial arts.

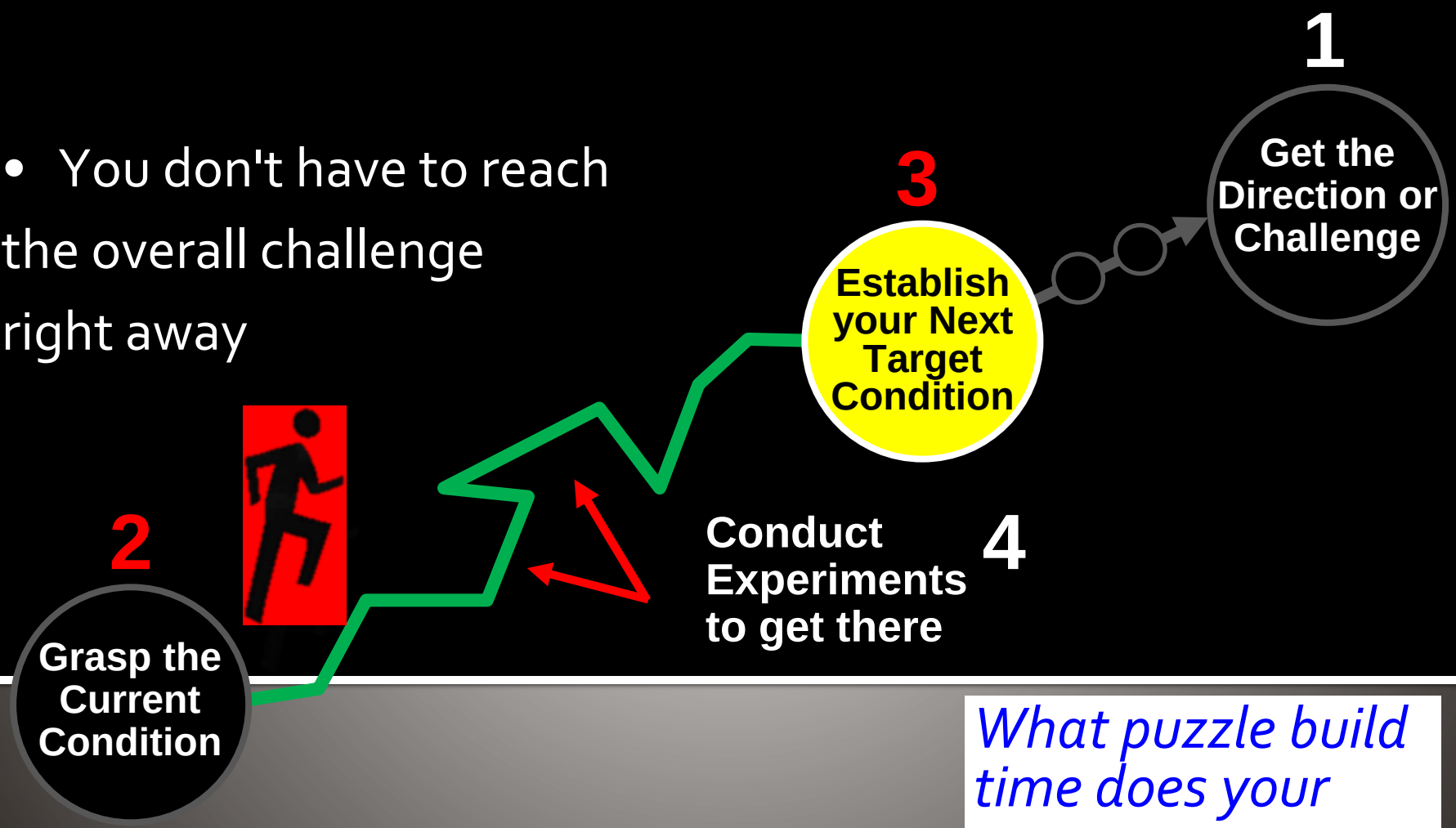

A Kata is a routine you practice, so it's pattern becomes a habit and gives you new skills
Mike Rother Ph.D.

Let's go through the four steps of the Improvement Kata

Mike Rother Ph.D.

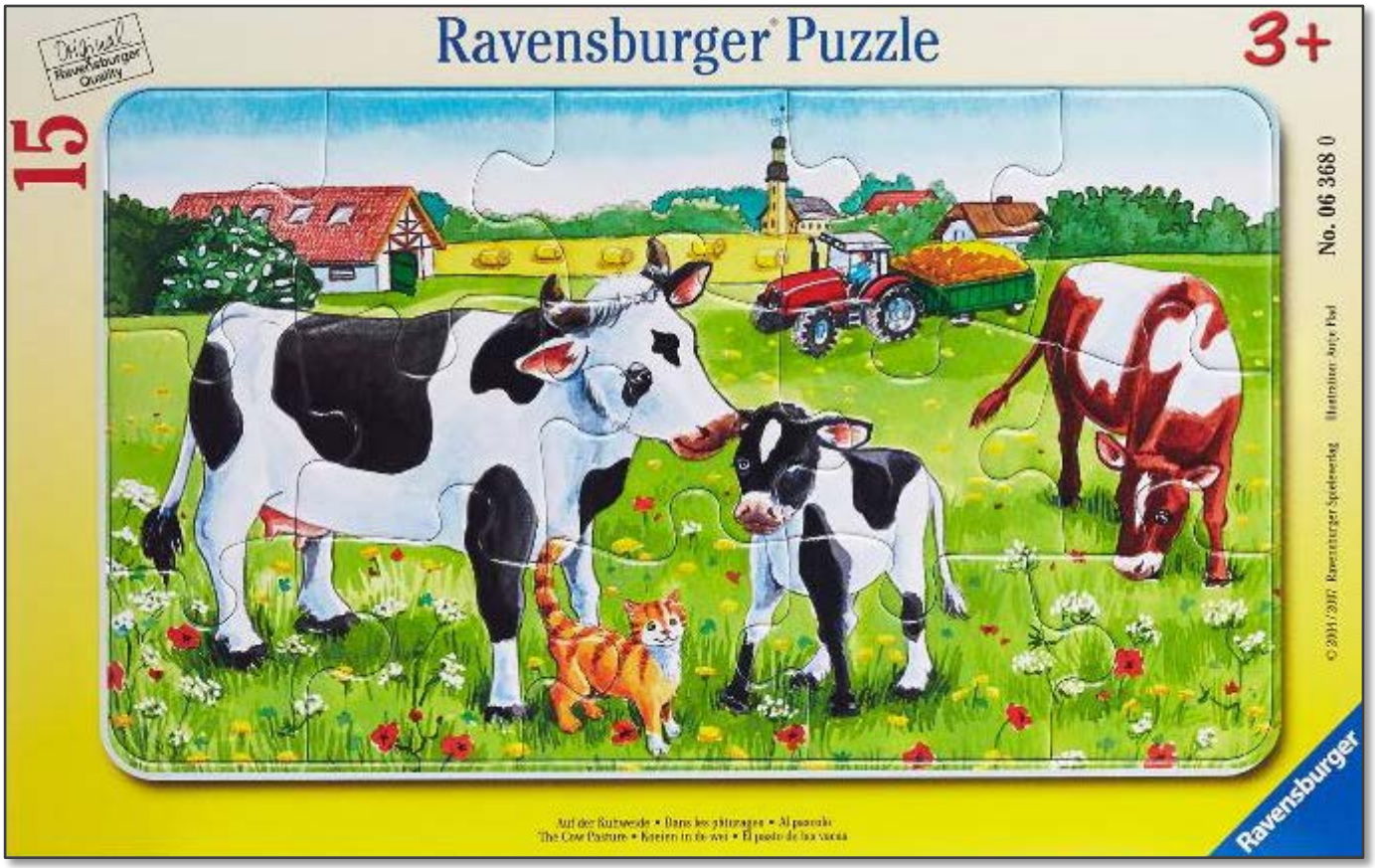
THE FOUR STEPS OF THE IMPROVEMENT KATA APPROACH

- You don't have to reach the overall challenge right away



What puzzle build time does your team want to reach?

Mike Rother Ph.D.



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Choose a Team Name

Select a Timekeeper

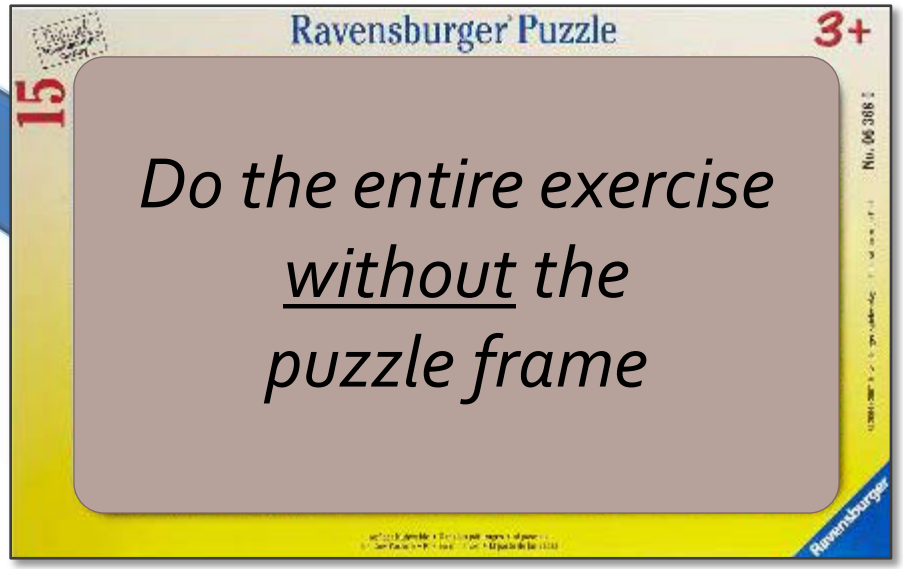
→ Each gets a stopwatch

Select a Data Recorder

→ 'Baseline Rounds' form

- Take the puzzle out of the bag and study the picture.
- Remove the puzzle pieces from the frame.

Put the Frame Aside



Now build the puzzle once!

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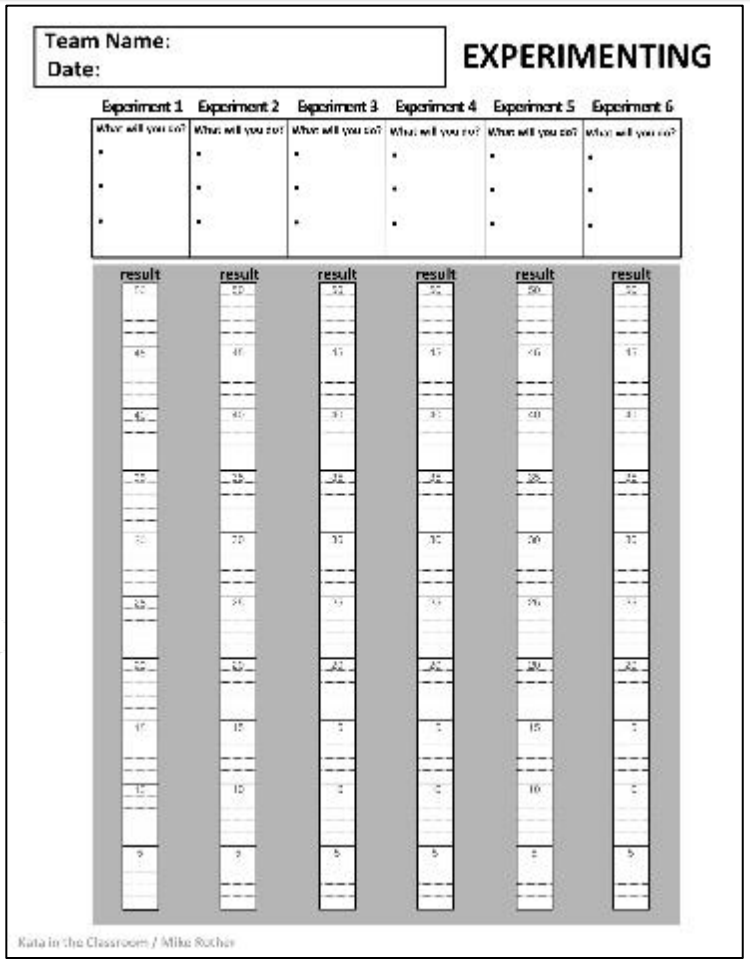
Documenting YOUR Experiments



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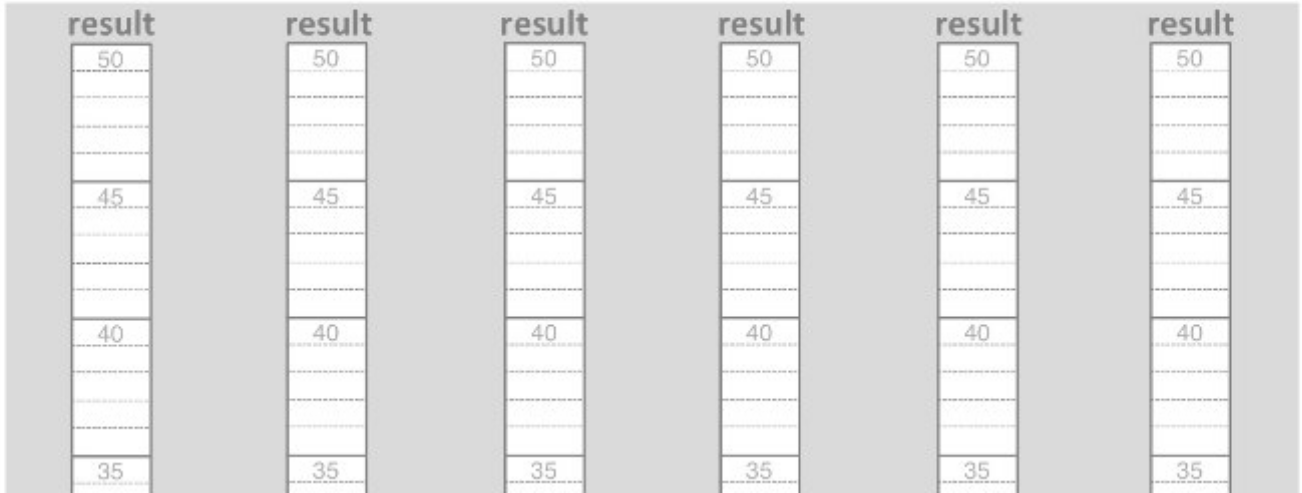
Before each round, write the ideas you want to test on your 'Experimenting' form

Team Name:
Date:

EXPERIMENTING

Experiment 1	Experiment 2	Experiment 3	Experiment 4	Experiment 5	Experiment 6
What will you do?	What will you do?	What will you do?	What will you do?	What will you do?	What will you do?
•	•	•	•	•	•
•	•	•	•	•	•
•	•	•	•	•	•

Write down the ideas for your first experiment



RULES

(1) "START Position" =

- Puzzle pieces shuffled in random order
- Pieces face down in one stack
- Hands flat on the table
- No talking

(2) All Teams Start Together

a. Instructor calls "START"
b. Build the puzzle
c. Note the elapsed time on your form

(3) Don't Write on the Puzzle

Summary

4 Tools to Transform your lab

- **5** S –Strive for workplace organization and visual controls
- Standard Work – Minimize the variation in your processes
- A3- Specific problem solving method incrementally
- Kata- Apply Plan, Do, Check Act to each improvement for continuous improvement