



## Introduction to A3 Problem Solving

### Problem Solving through People

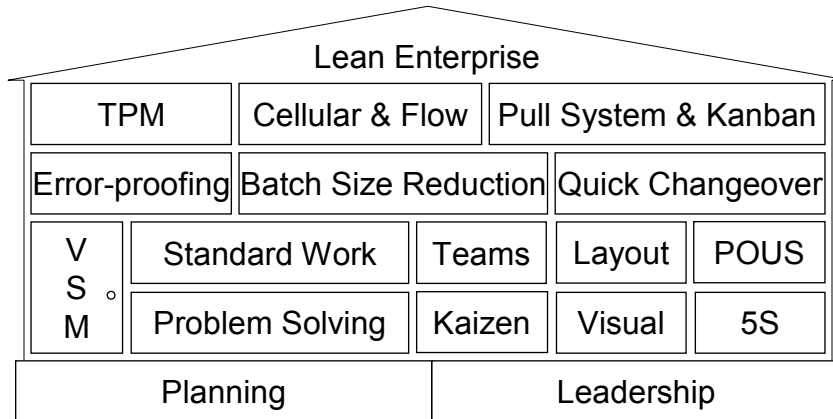
Developed by  
Anthony Manos

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## Agenda

- Introduction to A3
- P-D-C-A cycle
- Team Based Problem Solving
- Problem Solving Tools
- The A3 Report
- Real World Application

# Building Blocks of a Lean Enterprise



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3



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## Introduction to A3

*“What is this A3 thing I keep hearing about?”*

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## What is A3?

- A3 refers to the size of the sheet of paper (11" x 17")
- A simple way to capture data and information
- A standardized approach for team based problem solving
- An easy way to visually communicate information and ideas – it tells the story

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5

## History of A3



- Part of Toyota's Quality Circle problem solving efforts in the 1960s
- It allowed the teams to get the most important information on one sheet of paper to easily read, understand and make decisions
- If you can't say it with one page, you're not concise enough
- Toyota and others have different styles of A3 based on scope and need

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## Ways to Use A3s

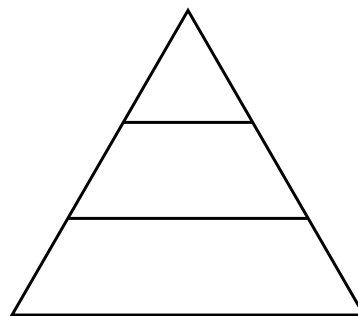
- Describe, understand and solve a problem
- Present a new product concept
- Propose a technical solution
- Capture knowledge from past programs
- Explain an organization's vision, mission and values
- Team Charters
- Present market research and customer data
- Analyze trade-off decisions or cost-benefits
- Document a standard procedure or test

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## Scopes of A3s

- Strategic
  - Hoshin, Business Planning
- System
  - Value Stream Mapping, Design Team Planning
- Process
  - Standard Work
  - Problem solving

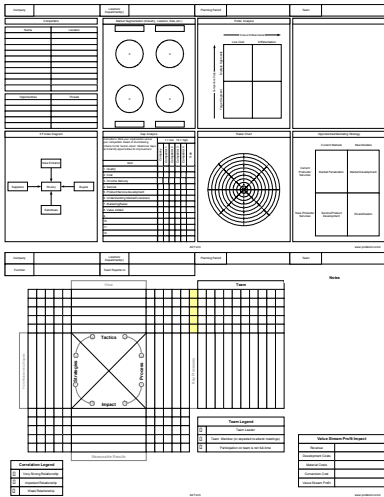


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# Strategic A3 Forms

- Environmental Scan
- SWOT Analysis
- Vision, Mission, Values
- Competitor Analysis
- Radar Chart and Gap Analysis
- Tree Diagram
- X-box (X-matrix)
- Deployment Plan
- Plan Review

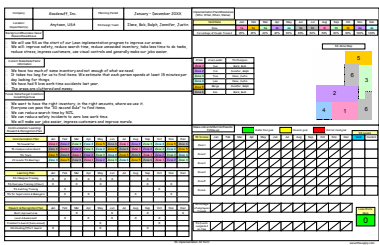
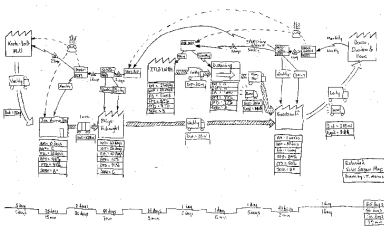


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# System A3 Forms

- Value Stream Maps
  - Current State
  - Future State
  - Ideal State
- Design Team Plans



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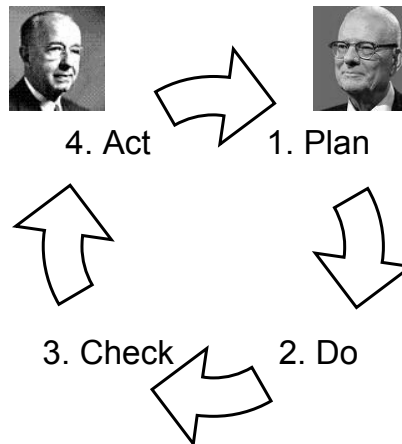
## P-D-C-A

Plan-Do-Check-Act

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## P-D-C-A Cycle

- Shewart Cycle or Deming Cycle
- Core of improvement activities
- A.k.a. Plan-Do-Study-Act
- Never-ending



## Plan

- Select the problem to be analyzed
- Clearly define the problem and establish a precise problem statement
- Identify the processes that impact the problem and select one
- List the steps in the process as it currently exists
- Map the Process
- Identify potential cause of the problem
- Collect and analyze data related to the problem
- Verify or revise the original problem statement
- Identify root causes of the problem

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## Do

- Establish criteria for selecting a solution
- Generate potential solutions that will address the root causes of the problem
- Select a solution
- Gain approval and support of the chosen solution
- Plan the solution
- “Test” the change
- Implement the chosen solution on a trial or pilot basis

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16

## Check

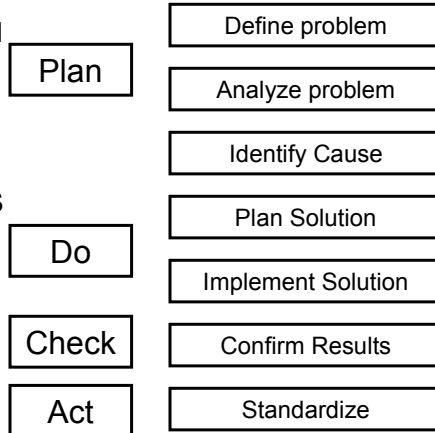
- Gather data on the solution
- Analyze the data on the solution
- Review the action, analyze the results and identify what lessons learned
- Use the measure or metrics to determine Planned Vs. Actual

## Act

- Take action based on what you learned in the Check step - If the change did not work, go through the cycle again with a different plan. If you were successful, standardize to the new way
- Use what you learned to plan new improvements, beginning the cycle again
- Identify systemic changes and training needs for full implementation
- Adopt the solution
- Plan ongoing monitoring of the solution
- Continue to look for incremental improvements to refine the solution
- Look for another improvement opportunity

# PDCA Flow

- Use these seven steps to help lead you through the PDCA cycle
- If after “Check” you didn’t have the results needed the next step is to capture Lessons Learned and go back to “Plan”



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## Team Based Problem Solving

*“When the team wins, everybody wins.”*

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## Problem Solving Teams

- A3s are perfect to facilitate team based problem solving
- Teams outperform individuals (one brain versus many)
- Working together to solve the problem builds buy-in and ownership



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## Team Make-up

- Typically Problem solving A3s are made up of small groups (approximately 3-5 people)
- Having process owners or value-adders is a must
- A good cross-functional representation is recommended
- This allows the people closest to the problem to make an impact

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## Advantages of Using A3s

- By allowing the team to focus, this reduces the time needed to prepare and implement the ideas



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## Problem Solving Tools

*“When all you have is a hammer, everything looks like nail.”*

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## 8 Wastes

- As part of Lean, you have to learn how to identify waste so that you can eliminate it
  - As part of problem solving, try to eliminate waste and other non-value added activities
- OMIT What U DO
- Overproduction
  - Motion
  - Inventory
  - Transportation
  - Waiting
  - Under-utilized people
  - Defects
  - Over-processing

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25

## Examples of Tools for A3

- 5 Whys
- Affinity Diagram
- Brainstorming
- Check Sheet
- Control Charts
- Fishbone Diagram
- Flow Chart
- Gantt Chart
- Histogram
- Matrix Diagram
- Pareto Diagram
- PDPC
- Radar Chart
- Relations Diagram
- Activity Network Diagram
- Run Chart
- Scatter Diagram
- Sketches
- Spaghetti Diagram
- Tree Diagram
- Value Stream Map

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26

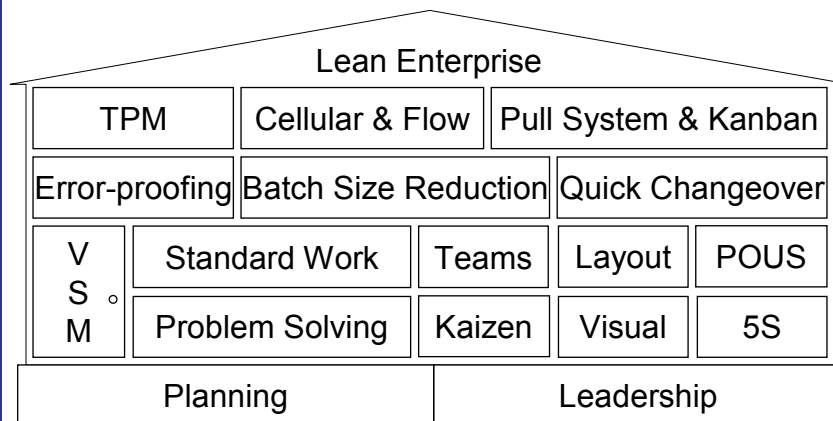
## Selecting tools

- Select the correct tool (or tools)
- Think about the resources (cost, time, effort, hardware, software, people) needed to use the tool
- Train others in the use of the tool if necessary
- Data integrity (GIGO)
- Don't get stuck in analysis paralysis

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## Other Tools

- There are many other problem solving tools and techniques
- Practice, practice, practice
- Learn new tools as you go



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## The A3 Form

*Clear, concise, simple*

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## The A3 Form

- The form itself is not the solution – it's the *thinking* and the *process* that makes A3 a powerful tool
- There are different versions of the form based on scope and need – there is no one A3 form that does it all; make it fit your requirements
- It is typically read from the upper left corner down and then the upper right side down

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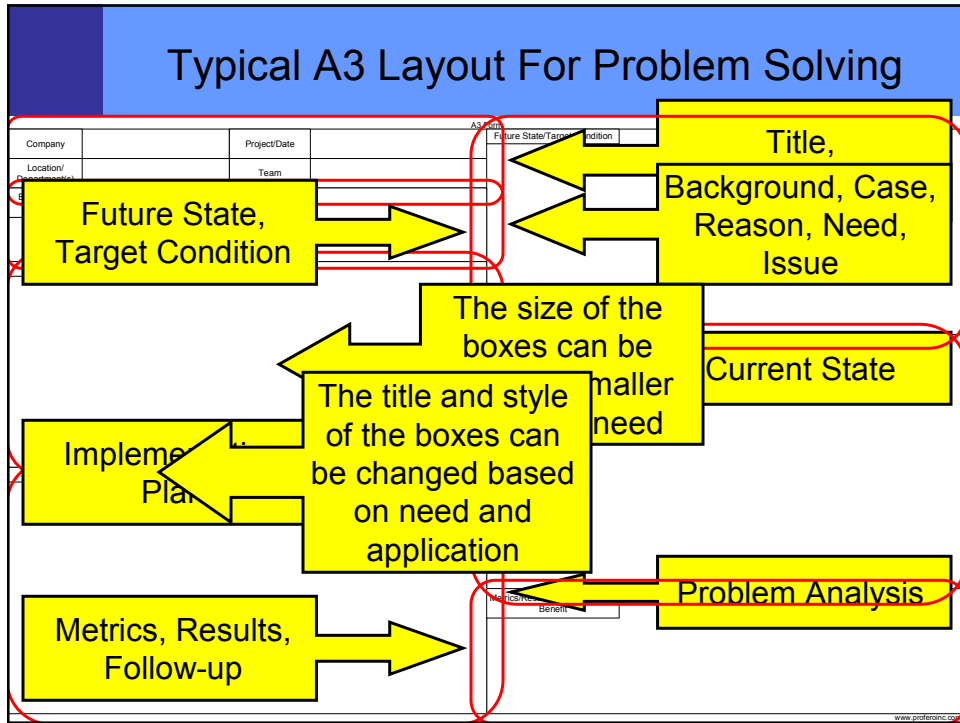
31

## Typical Information on A3

- Title/header information
- Background information, business case, reason, need, issue
- Current State
- Problem Analysis
- Future State, target condition
- Implementation plan (who, what, when, when, where, status)
- Metrics, results, follow-up, cost-benefit analysis

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## Format

- Use words only when you can't describe the situation with a drawing, sketch, graph, chart, diagram or something visual
- The A3 should be easy to read, logical and tell a story

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## Header Information

- Basic information about the company, team, date. etc.
- Consider that you will be doing many of these and therefore need to have a way to identify them by area or team

## Background

- Background, business case, reason, need, or issue
- Focus on the issue or problem, not the solution
- Use a customer focus if needed

## Current State Information

- Provide facts, data, and information – “go see”
- Make it visual – consider using graphs, drawings, etc.
- Do not judge – reserve that for the analysis phase
- Do not solve the problem during this phase – you may end up with a solution that will cause more problems later

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## Problem Analysis

- At this point, analyze the information that you have gathered
- Try to get to the root cause of the problem
- Use tools such as the “5 Whys”

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## Future State

- Future State or target conditions
- Answer the question “What do you *really* want?”
- What are the countermeasures to the specific issue?
- Keep the customer in mind
- Don’t optimize one area and sub-optimize another
- Use “Creativity before capital”

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## Implementation Plan

- Who, what, when, status
- Layout the steps and timing – consider if things can be done concurrent or parallel
- Make sure to identify the team leaders
- Determine a way to keep track of the progress – typically through measures or metrics

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## Metrics/Results/Follow-up

- Metrics, results, follow-up, cost-benefit
- This is the opportunity to show how close the results were to plan (a.k.a. Plan vs. Actual)
- Since the scientific method is part of Toyota's DNA, this allows the team to "experiment" to achieve the best results
- Prioritizing projects based on cost-benefit comparison
- Consider the total long-term impact on the organization

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## Intangible benefits

- Try converting intangible benefits also into dollar terms, so as to have the same units of comparison
- Enlist accountants' help
- Realize that there are other benefits other than just money like:
  - Safety, Quality, Ergonomics, Search time, Morale, Customer satisfaction, Teamwork, Employee satisfaction/retention, Pleasant organized workplace

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# Working Document

- A3s are working documents
- There aren't meant to be picture perfect or pretty (although they must be somewhat legible)
- Don't waste time to put in on a computer, use digital photos, etc.
- Use pencil and eraser!

# Manufacturing

Company	KLAC	Project/Date	PART NO. - 232 7/1/08																								
Location (Department)	WC 89	Team	TEAM (MEMBERS) Jim - Jim, Matt, Shawn, Logan, Mike, Wade																								
Background/Business Case/Reason/Need/Issue	<p>We want to make any improvements (faster, better, cheaper, safer...)</p> <p>This is a typical part - any measurements made here may apply to other parts</p> <p>This is a frame/casing experience</p> <p>We want to reduce floor/waste (e.g. table time)</p> <p>Find a way for easier loading</p> <p>Could better material flow</p> <p>Make things easier for the operator</p>																										
Current State																											
Problems Analysis	<p><b>Problem</b>      <b>Interference</b>      <b>Time/Space/Flow</b>      <b>Waste</b>      <b>Order</b>      <b>Quality</b>      <b>Defect</b>      <b>Overproduction</b></p> <p>36\"/&gt; </p>																										
Implementation Plan (Who, What, When, Status)	<table border="1"> <thead> <tr> <th>Item</th> <th>Who</th> <th>When</th> <th>Status</th> </tr> </thead> <tbody> <tr> <td>WORK TABLE</td> <td>MARK, GEORGE, SHAWN</td> <td>BY 7/15</td> <td>IN DESIGN</td> </tr> <tr> <td>REWORK AREA</td> <td>MARK, GEORGE, SHAWN</td> <td>7/1</td> <td>COMPLETE</td> </tr> <tr> <td>TABLE FEED</td> <td>MARK, WYLY</td> <td>BY 7/15</td> <td>REWORK COMPLETE</td> </tr> <tr> <td>WIRE AND TOOL</td> <td>MARK, GEORGE, SHAWN</td> <td>7/1</td> <td>COMPLETE</td> </tr> <tr> <td>MATERIAL</td> <td>MARK, GEORGE, SHAWN</td> <td>BY 7/15</td> <td>W/ DESIGN</td> </tr> </tbody> </table>			Item	Who	When	Status	WORK TABLE	MARK, GEORGE, SHAWN	BY 7/15	IN DESIGN	REWORK AREA	MARK, GEORGE, SHAWN	7/1	COMPLETE	TABLE FEED	MARK, WYLY	BY 7/15	REWORK COMPLETE	WIRE AND TOOL	MARK, GEORGE, SHAWN	7/1	COMPLETE	MATERIAL	MARK, GEORGE, SHAWN	BY 7/15	W/ DESIGN
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Cost/Benefit	<table border="1"> <thead> <tr> <th></th> <th>BEFORE</th> <th>AFTER</th> <th>IMPROVEMENT</th> <th>COMMENTS</th> </tr> </thead> <tbody> <tr> <td>WORKING SPACE</td> <td>~1000 ft<sup>2</sup></td> <td>~5500 ft<sup>2</sup></td> <td>55%</td> <td>10% MORE WORK AREA</td> </tr> <tr> <td>LOADING TIME</td> <td>~20min</td> <td>~2min</td> <td>10x (90%)</td> <td>LESS TIME TO GET PART</td> </tr> <tr> <td>WASTED TIME</td> <td>~45min</td> <td>~15min</td> <td>3x</td> <td>LESS WASTE</td> </tr> </tbody> </table> <p>OTHER BENEFITS</p> <ul style="list-style-type: none"> <li>• IT'S EASIER FOR THE OPERATOR</li> <li>• BETTER MATERIAL FLOW</li> <li>• WORKER PROTECTS HIS AREA</li> <li>• EASIER TO GET GOOD THINGS AND IMPROVE THEM</li> </ul> <p>Future Improvements Plan Plan for NEXT EVENT Work on Improvements Special Thanks to Jim and Matt</p>				BEFORE	AFTER	IMPROVEMENT	COMMENTS	WORKING SPACE	~1000 ft <sup>2</sup>	~5500 ft <sup>2</sup>	55%	10% MORE WORK AREA	LOADING TIME	~20min	~2min	10x (90%)	LESS TIME TO GET PART	WASTED TIME	~45min	~15min	3x	LESS WASTE				
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# Healthcare

A3 Form

<b>Company</b>	The Toledo Hospital	<b>Project/Date</b>	21408 - 1/18/09	<b>Future State/Target Condition</b>																																																																																																
<b>Location/ Department(s)</b>	Anatomic Pathology	<b>Team</b>	Rehana Hame, Kathy Gensersack, Lynn Pyrek, Randa Hameid	<ol style="list-style-type: none"> <li>Place on wall by room where processor slides are stored</li> <li>Standardize - Write up 4 pin numbers - color coding</li> <li>Clear gloves in locker</li> <li>Clear blocks for - organized</li> <li>Label setting in slide</li> <li>Check blocks and slide to make sure they match</li> <li>Barcode system</li> <li>Inscribe to CoPath</li> <li>Sorters</li> <li>Hooking cassette labeler and slide labeler to sorters</li> </ol>																																																																																																
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<p>1. Can get rid of oven - currently only used for making paraffin.</p> <p>2. Heavy one side for making paraffin</p> <p>3. Clutter in lab</p> <p>4. Currently have microtome - floor stands - workbench on linear bench behind the station</p> <p>5. Mobile - by wall under window</p> <p>6. Working glove - cause slip of cut-offs</p> <p>7. People walk behind causing air drifts</p> <p>8. Slides are not cut - cause different labels - sometimes place paper towel overlap of them</p> <p>9. Labels are not cut - cause different labels - sometimes place paper towel overlap of them</p> <p>10. Labels are not cut - cause different labels - sometimes place paper towel overlap of them</p> <p>11. Labels are not cut - cause different labels - sometimes place paper towel overlap of them</p>				<table border="1"> <thead> <tr> <th>ID</th> <th>MEASURE / METRIC</th> <th>BEFORE</th> <th>AFTER</th> <th>SAVINGS / REDUCTIONS</th> </tr> </thead> <tbody> <tr> <td>1</td> <td>Cost of Equipment (One time fee)</td> <td>\$0</td> <td>\$24,115.78</td> <td>(\$24,115.78)</td> </tr> <tr> <td>2</td> <td>Labeling Time / Slide (sec)</td> <td>212 (MANUAL)</td> <td>4 (AUTO)</td> <td>TBD</td> </tr> <tr> <td>3</td> <td>Embedding - Assigning Cases Time (min)</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> </tr> <tr> <td>4</td> <td>Reduction of errors</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> </tr> <tr> <td>5</td> <td>Filing time</td> <td>TBD</td> <td>TBD</td> <td>TBD</td> </tr> <tr> <td>6</td> <td>Time needed to correct/decipher slide labels</td> <td>15 min</td> <td>0 min</td> <td>100%</td> </tr> <tr> <td>7</td> <td>Labor (labeling and correcting)</td> <td>\$19,394.44</td> <td>0</td> <td>\$19,394.44</td> </tr> <tr> <td>8</td> <td>Supply Costs</td> <td>\$2,658.89</td> <td>\$2,413.00</td> <td>\$244.89</td> </tr> <tr> <td colspan="2"><b>TOTAL ANNUAL SAVINGS:</b></td> <td></td> <td></td> <td><b>(\$8,074.86)</b></td> </tr> </tbody> </table>	ID	MEASURE / METRIC	BEFORE	AFTER	SAVINGS / REDUCTIONS	1	Cost of Equipment (One time fee)	\$0	\$24,115.78	(\$24,115.78)	2	Labeling Time / Slide (sec)	212 (MANUAL)	4 (AUTO)	TBD	3	Embedding - Assigning Cases Time (min)	TBD	TBD	TBD	4	Reduction of errors	TBD	TBD	TBD	5	Filing time	TBD	TBD	TBD	6	Time needed to correct/decipher slide labels	15 min	0 min	100%	7	Labor (labeling and correcting)	\$19,394.44	0	\$19,394.44	8	Supply Costs	\$2,658.89	\$2,413.00	\$244.89	<b>TOTAL ANNUAL SAVINGS:</b>				<b>(\$8,074.86)</b>																																														
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# Office

<b>Department/Location</b>	Storeroom	<b>Leader/Team</b>	Ilene Werk, Justin Tyme, Seymour Waiste																																																								
<b>Business Case (State the compelling reason why this is important)</b>		<b>Future State (How we want it to be)</b>																																																									
<p>We spend too much time searching for the right toner cartridges/ink cartridges in the storeroom. Sometimes it can take two (or more) trips to get the right one. Purchasing switches the brands to get a better price and we're not sure which one to use. If we have 20 printers and we waste 15 minutes each time we search for it (on average once a month) then we waste 60 man-hours per year just to get a toner/ink cartridge!</p>		<ol style="list-style-type: none"> <li>When a new printer is bought, it will be labeled by the IT department with the type of toner/ink cartridge and the shelf location in the storeroom.</li> <li>Each printer will have one toner/ink cartridge at point of use.</li> <li>When a toner/ink cartridge needs to be replaced, the user puts in the new toner/ink cartridge and returns the empty to the receptionist to order a new one.</li> </ol>																																																									
<b>Current State (How it is today)</b>		<b>Implementation (What is our plan to get there)</b>																																																									
<p>We don't always have the right toner/ink cartridges or don't know which one to use because purchasing gets different brands to save money. We waste time searching for them in the storeroom even though the shelves are marked.</p>		<table border="1"> <thead> <tr> <th>Who</th> <th>What</th> <th colspan="5">When</th> <th>Notes</th> </tr> <tr> <th></th> <th></th> <th>M</th> <th>T</th> <th>W</th> <th>R</th> <th>F</th> <th></th> </tr> </thead> <tbody> <tr> <td>Ralph</td> <td>Setup IT One point lesson</td> <td>X</td> <td></td> <td></td> <td></td> <td></td> <td>Train IT Help Desk</td> </tr> <tr> <td>Joanne</td> <td>Change shelves and label</td> <td>X</td> <td>X</td> <td></td> <td></td> <td></td> <td>Red Tag unneeded items</td> </tr> <tr> <td>Jennifer</td> <td>Make sure printers are labeled</td> <td></td> <td>X</td> <td>X</td> <td></td> <td></td> <td>Standardized labels</td> </tr> <tr> <td>Jennifer</td> <td>Toner/Ink cartridge at POU</td> <td></td> <td></td> <td></td> <td>X</td> <td></td> <td>Label storage spot</td> </tr> <tr> <td>George</td> <td>Train receptionist on new procedure.</td> <td></td> <td></td> <td></td> <td></td> <td>X</td> <td></td> </tr> </tbody> </table>		Who	What	When					Notes			M	T	W	R	F		Ralph	Setup IT One point lesson	X					Train IT Help Desk	Joanne	Change shelves and label	X	X				Red Tag unneeded items	Jennifer	Make sure printers are labeled		X	X			Standardized labels	Jennifer	Toner/Ink cartridge at POU				X		Label storage spot	George	Train receptionist on new procedure.					X	
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<b>Problem Analysis (Use data, information, 5 Whys, Pareto Analysis, etc.)</b>		<b>Metrics (How do we know we are making progress?)</b>																																																									
<p>We have 20 printers, 8 different models and 36 different toner/ink cartridges in the storeroom. We even found 10 toner cartridges that we don't use anymore.</p> <p>Since we know that printers wear out or we have to get new ones, there will always be a different model and type of toner/ink cartridges to deal with.</p> <p>We waste time trying to find the right toner/ink cartridge          Why: because we're not always sure which one to use          Why: it's not clear which type to use          Why: we have many types in the storeroom          Why: no one verifies what we have          Why: not assigned to anyone</p> <p>We need a simple system to be able to get the right toner/ink cartridge even when purchasing buys different brands.</p>		<p>Time to retrieve toner/ink cartridges</p> <table border="1"> <thead> <tr> <th>Week</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> </tr> </thead> <tbody> <tr> <td>15</td> <td>6</td> <td>4</td> <td>2</td> <td>1</td> <td>1</td> <td></td> </tr> </tbody> </table> <p>Toner/ink cartridge inventory</p> <table border="1"> <thead> <tr> <th>Week</th> <th>1</th> <th>2</th> <th>3</th> <th>4</th> <th>5</th> <th>6</th> </tr> </thead> <tbody> <tr> <td>Inventory</td> <td>46</td> <td>25</td> <td>15</td> <td>10</td> <td>10</td> <td>11</td> </tr> </tbody> </table>		Week	1	2	3	4	5	6	15	6	4	2	1	1		Week	1	2	3	4	5	6	Inventory	46	25	15	10	10	11																												
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<p>Signed by: <i>Ilene Werk</i>          Inc. 2008</p>		46																																																									

# Advantages

- Allows the progress, review and Lessons Learned to be reviewed by different interested parties like: management, bench-marking by other departments, other problem solving teams, auditors, ISO, Joint Commission, etc.
- You have a method to document results (instead of relying on tribal knowledge)



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## Wrap-up & Evaluations

Open discussion  
Q&A

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# Thank you

- Feel free to contact me if you have any comments or questions
- Visit our website for free downloads and more information about Lean

Website:  
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# Developer

## Anthony Manos

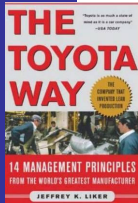
- Tony Manos is a Catalyst with expertise in Lean and quality. Trained and certified by the Department of Commerce, National Institute of Standards and Technology (NIST) in Lean principles and as a trainer in Lean courses. International speaker on Quality and Lean Enterprise topics.
- Mr. Manos is a Senior Member of ASQ with several certifications. He is also a Shingo Prize Examiner and helped developed the AME/SME/Shingo Prize Lean Certification.



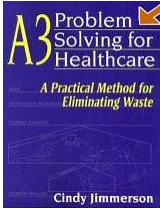
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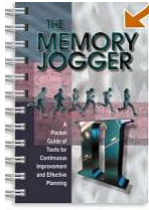
# Recommended Reading



The Toyota Way –  
14 Management  
Principles from the  
World's Greatest  
Manufacturer by  
Jeffrey Liker



A3 Problem Solving  
for Healthcare: A  
Practical Method for  
Eliminating Waste  
by Cindy Jimmerson



The Memory Jogger II  
by Michael Brassard