



Introduction to A3 Problem Solving



**2009 Lean
Six Sigma
Conference**

March 2-3,
2009 • Phoenix, Arizona

Profero, Inc.
124 W. Polk Street
Suite 101
Chicago, IL 60605-1770
Tel: 312.294.9900
Fax: 312.294.9911
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Problem Solving through People

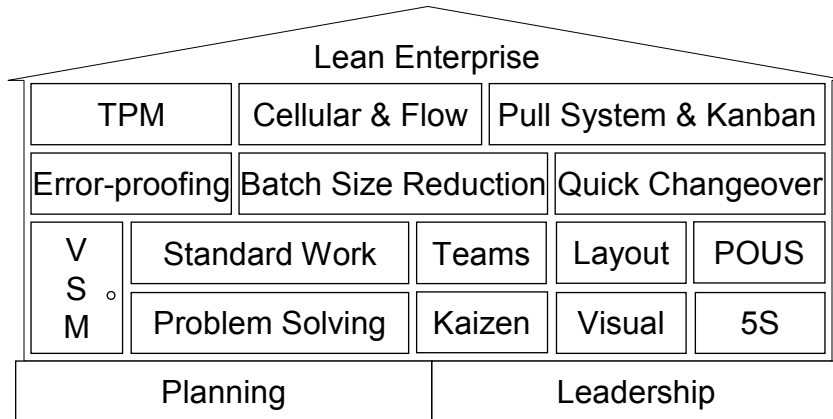
Developed by
Anthony Manos

**Monday, March 2, 2009
2:00 pm – 3:00 pm
Session C6**

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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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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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

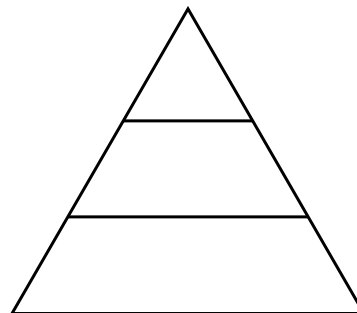
- Describe, understand and solve a problem
- Present a new product concept
- Propose a technical solution
- Capture knowledge from past programs
- Explain an organization's vision, mission and values
- Team Charters
- Present market research and customer data
- Analyze trade-off decisions or cost-benefits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

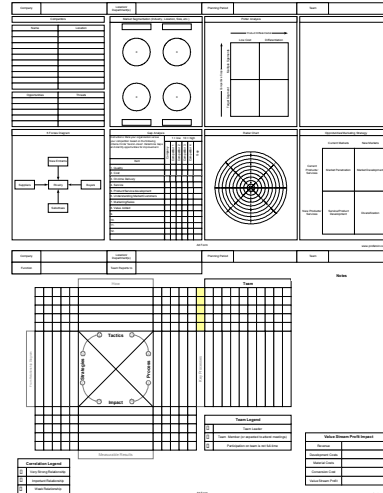


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Strategic A3 Forms

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

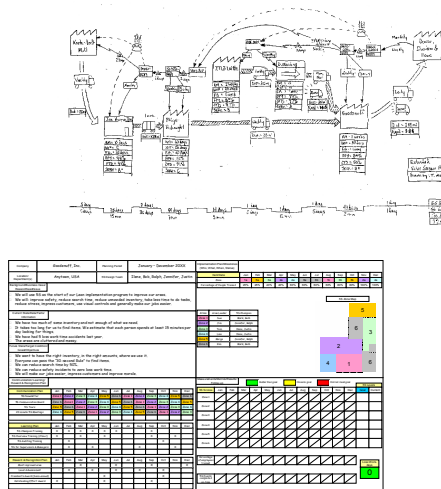


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System A3 Forms

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



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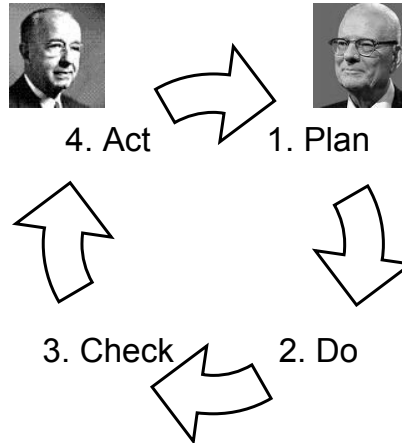
P-D-C-A

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

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

Check

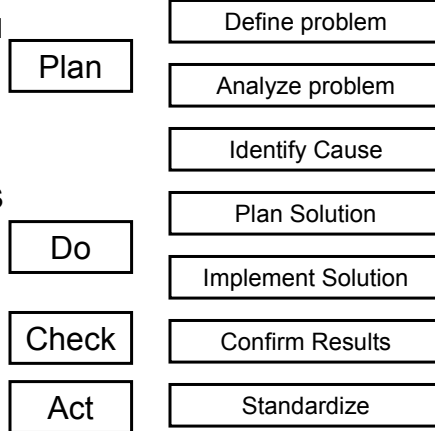
- Gather data on the solution
- Analyze the data on the solution
- Review the action, analyze the results and identify what lessons learned
- Use the measure or metrics to determine Planned Vs. Actual

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

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

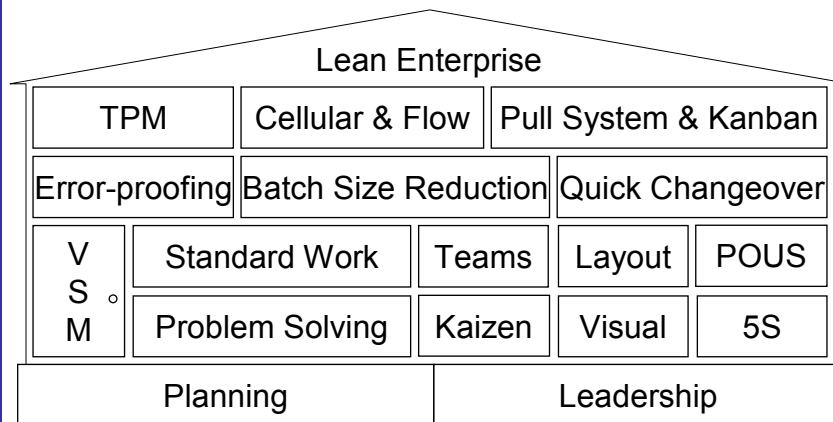
Selecting tools

- 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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Building Blocks of a Lean Enterprise



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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

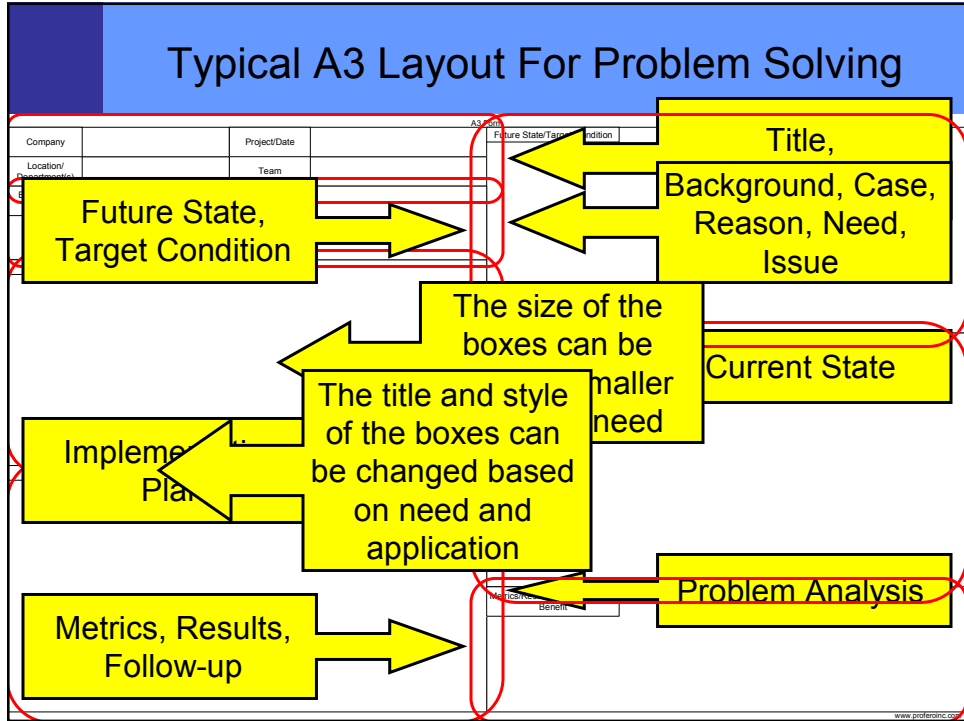
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The A3 Form

- 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

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



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

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”

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”

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

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

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

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	KLMC	Project/Date	Plant No. - 752	7/2/08																								
Location Department(s)	WC 89	Team	TERRY (PLANT MGR) BOB - PLAN, MARK, GEORGE, GAVIN, MIKE, JACOB																									
Background/Initial Cause Reason/Need/Why	<p>1st visit to make any improvements (factor, better, change, new...) - This is a typical set-up, many improvements made here may apply to other parts - This is a frame/cleaning experience - We want to reduce eliminate waste (e.g. idle time) - Find a way for easier loading - Create better material flow</p>																											
Current State	<p>360 degree per shift 2nd visit - 7/2/08 3rd visit - 7/2/08 4th visit - 7/2/08</p>																											
Problem Analysis	<p>Summary - 360 degree per shift - 1st visit - 7/2/08 - 2nd visit - 7/2/08 - 3rd visit - 7/2/08 - 4th visit - 7/2/08</p> <p>Problem - 360 degree per shift - 1st visit - 7/2/08 - 2nd visit - 7/2/08 - 3rd visit - 7/2/08 - 4th visit - 7/2/08</p> <p>Root Cause - 360 degree per shift - 1st visit - 7/2/08 - 2nd visit - 7/2/08 - 3rd visit - 7/2/08 - 4th visit - 7/2/08</p> <p>Countermeasures - 360 degree per shift - 1st visit - 7/2/08 - 2nd visit - 7/2/08 - 3rd visit - 7/2/08 - 4th visit - 7/2/08</p> <p>Verification - 360 degree per shift - 1st visit - 7/2/08 - 2nd visit - 7/2/08 - 3rd visit - 7/2/08 - 4th visit - 7/2/08</p> <p>Standard - 360 degree per shift - 1st visit - 7/2/08 - 2nd visit - 7/2/08 - 3rd visit - 7/2/08 - 4th visit - 7/2/08</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>MAKE MIDDLE 360 CHST</td> <td>MARK, GEORGE, GAVIN</td> <td>BY 7/25</td> <td>IN DESIGN</td> </tr> <tr> <td>REWORK AREA</td> <td>MARK, GEORGE, GAVIN</td> <td>7/25</td> <td>COMPLETE</td> </tr> <tr> <td>TRUCK TRUCK</td> <td>MARK, WALLY</td> <td>BY 7/25</td> <td>PENDING COMPLETE</td> </tr> <tr> <td>LOADING BASKET</td> <td>MARK, GEORGE, GAVIN</td> <td>7/25</td> <td>COMPLETE</td> </tr> <tr> <td>MAKE A 360 PER HOUR BASKET</td> <td>MARK, GEORGE, GAVIN</td> <td>BY 7/25</td> <td>IN DESIGN</td> </tr> </tbody> </table>				Item	Who	When	Status	MAKE MIDDLE 360 CHST	MARK, GEORGE, GAVIN	BY 7/25	IN DESIGN	REWORK AREA	MARK, GEORGE, GAVIN	7/25	COMPLETE	TRUCK TRUCK	MARK, WALLY	BY 7/25	PENDING COMPLETE	LOADING BASKET	MARK, GEORGE, GAVIN	7/25	COMPLETE	MAKE A 360 PER HOUR BASKET	MARK, GEORGE, GAVIN	BY 7/25	IN DESIGN
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Success/Results/Follow-up Cost Benefit	<table border="1"> <thead> <tr> <th>Item</th> <th>Before</th> <th>After</th> <th>Improvement</th> <th>Comments</th> </tr> </thead> <tbody> <tr> <td>WORKING SPACE</td> <td>~7000 P</td> <td>~3260 P</td> <td>50%</td> <td>LESS SPACE, MORE PRODUCT</td> </tr> <tr> <td>LOADING TIME</td> <td>~5min</td> <td>~2min</td> <td>60% (5min to 2min)</td> <td>LESS TIME BY 60%</td> </tr> <tr> <td>WALKING TIME</td> <td>~45min</td> <td>~25min</td> <td>50%</td> <td>SAVE BY 21</td> </tr> </tbody> </table> <p>Future Action Items - 1st visit - 7/2/08 - 2nd visit - 7/2/08 - 3rd visit - 7/2/08 - 4th visit - 7/2/08</p>				Item	Before	After	Improvement	Comments	WORKING SPACE	~7000 P	~3260 P	50%	LESS SPACE, MORE PRODUCT	LOADING TIME	~5min	~2min	60% (5min to 2min)	LESS TIME BY 60%	WALKING TIME	~45min	~25min	50%	SAVE BY 21				
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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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124 W. Polk Street
Suite 101
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Fax: 312.294.9911
www.proferoinc.com

Thank you

- Feel free to contact me if you have any comments or questions
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Tony Manos
Catalyst
Profero, Inc.
124 W. Polk Street, Suite 101
Chicago, IL 60605-1770
USA
Office: 312.294.9900
Cell: 312.718.0078
Fax: 312.294.9911
Email:
anthony.manos@proferoinc.com

Developer

Anthony Manos

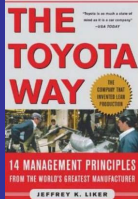
- Tony Manos is a Catalyst with expertise in Lean and quality. Trained and certified by the Department of Commerce, National Institute of Standards and Technology (NIST) in Lean principles and as a trainer in Lean courses. International speaker on Quality and Lean Enterprise topics.
- Mr. Manos is a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



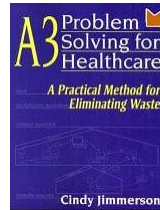
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Tony Manos
Catalyst
Profero, Inc.
124 W. Polk Street, Suite 101
Chicago, IL 60605-1770
USA
Office: 312.294.9900
Cell: 312.718.0078
Fax: 312.294.9911
Email: anthony.manos@proferoinc.com
Website: www.proferoinc.com

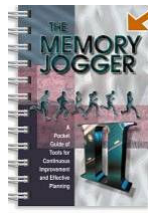
Recommended Reading



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