Lansing Community College

Course Cover Sheet

M-CAM Training Area:
☐CNC/Machining ☐Multi-Skilled Mechatronics ☒Production Operation ☐Welding/Fabrications

Program(s): Certified Production Technician

Course: Problem Solving for Production

Course Description:
This 8-hour course is an activity-based, pencil and paper tool designed to solve specific problems. It defines the current condition and looks at the root cause of the issue. The A3 also guides the user to define clear steps to implement changes and builds accountability. Participants will experience a simple and effective way to truly understand the way work happens now and how it can be redesigned effectively.

Date Created: September, 2016

Employer/Industry Partner:

Faculty Developer(s)/Instructional Designers(s): Brad Gilreath/Ann Lapo

College Contact: Jill Doederlein

Phone: 517.483.9665

Email: doederj@lcc.edu

Additional Information/Comments: Upon piloting the MSSC CPT, is was discovered that there was a lack of hands-on activities to solidify learning. LCC partnered with GM SME for direct input into course content.

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DESCRIPTION:
This 8-hour course is an activity-based, pencil and paper tool designed to solve specific problems. It defines the current condition and looks at the root cause of the issue. The A3 also guides the user to define clear steps to implement changes and builds accountability. Participants will experience a simple and effective way to truly understand the way work happens now and how it can be redesigned effectively.

TOTAL TIME REQUIREMENT for the course is 8 hours.

PREREQUISITES: Reading Level 4.

OBJECTIVES:
After completing this course, the student should be able to:

- Explain why continuous improvement is needed and why it is easier said than done.
- How to collect and use meaningful data.
- List advantages of A3 Problem Solving and describe how it is used to eliminate waste and reduce variation.
- Distinguish between value-added and non-value added activities.
- Apply A3 thinking along with basic quality tools (cause and effect, multi-voting, value-stream mapping, process flow, pictograph, Pareto, run chart, 5-why, 3L5W, scatter diagram, histogram) to solve actual work-related problems.

MATERIALS:

- Participant Guide: PowerPoint handouts per instructor specification.
- Handouts developed by the Instructor.
    - Numbers
    - 5-House
    - Albatross
    - Sash Bonding
- Books: Memory Jogger 2: Tools for Continuous Improvement and Effective Planning, dictionaries
- Graph Paper
- 12-inch ruler
- Calculator
- Video: “Cost of Quality” and “David Marquette, Submarine Captain” (available via YouTube)

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GRADING POLICY:

- Satisfactory completion of training (at least 75%) recommended.

College Grading Standards	Percent
4.0 Excellent	91-100%
3.5	86-90%
3.0 Good	81-85%
2.5	76-80%
2.0 Satisfactory	71-75%
1.5	66-70%
1.0	60-65%
0.0	0-59%

ACCEPTABLE USE POLICY:
Computer Resources

Use of College-owned computer resources is a privilege extended by the College to students, employees, and other authorized users as a tool to promote the mission of the College. All users agree to be bound by the terms and conditions of the LCC Acceptable Use Policy at the time they complete an account application form. Copies of the LCC Acceptable Use Policy are available at the Library Circulation Desk and may also be accessed on the World Wide Web. The URL is http://www.lcc.edu/policy/policies_1.aspx#ACCEPTABLE_USE_POLICY

Transfer Potential

For transferability information, please consult the Transfer Equivalency Information located at the LCC website at http://www.lcc.edu/transfer. For additional transferability information, contact the LCC Academic Advising Center, (517) 483-1904.

The MACRAO Transfer Agreement simplifies the transfer of students from one Michigan institution to another. The most current MACRAO Transfer Agreement information can be found at http://www.lcc.edu/transfer/macrao_agreement.aspx.

Student Code of Conduct and General Rules and Guidelines

LCC supports a positive educational environment that will benefit student success. In order to ensure this vision, the College has established the LCC Student Code of Conduct and the Student General Rules and Guidelines to ensure the protection of student rights and the health and safety of the College community, as well as to support the efficient operation of College programs. In addition, the College has established guidelines for the redress of grievances by individuals accused in such proceedings. A copy of the most current Code can be found on the College's website at http://www.lcc.edu/catalog/policies_procedures/studentrulesguidelines.aspx#code.

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TOTAL TIME REQUIREMENT for the course is 8 hours.

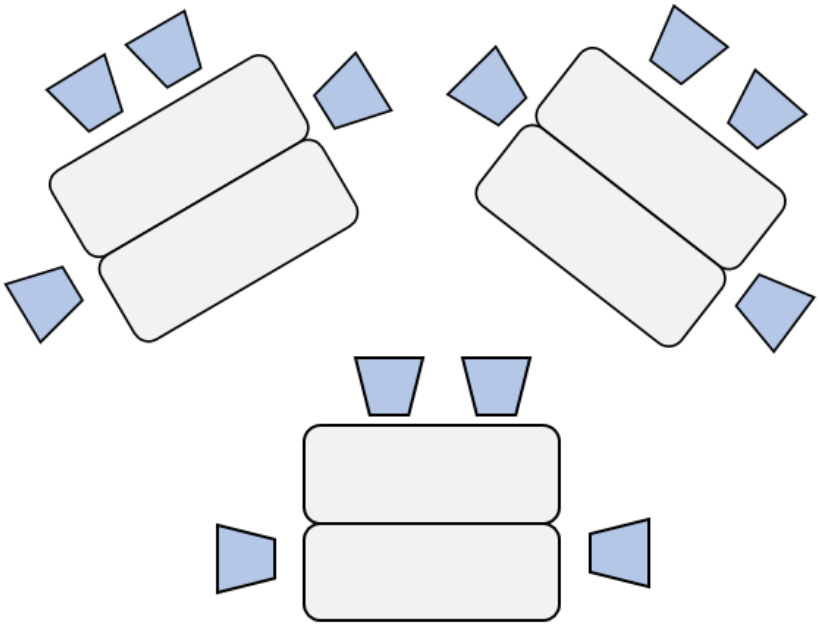
This course is recommended to be offered in one, 8-hour session or two, 4-hour sessions. One, 15-minute break is incorporated into each 4-hour session.

Delivery method is face-to-face in a classroom with the ability to project PowerPoint slides (see classroom setup below).

Printed handouts are provided to the participants.

Classroom setup: Allow 30-45 minutes for classroom setup and PowerPoint setup with projection prior to participant arrival. PowerPoint slides are printed as two slides per page and distributed to each student. See Syllabus/Instructor Guide for materials and handouts to be distributed throughout the course.

Classroom tables are set up as small groups, 4-6 people to each table. Make sure students can face front of the room.



Class room setup

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Class Start (45 minutes): Welcome, Sign-in, complete required paperwork(enrollment/registration, if needed), course description.

- PPT 1-3
- ACTIVITY: Instructor/Participant introductions
- ACTIVITY: Continuous Improvement (see PPT slide 3 notes)
- ACTIVITY: Short "tour" of the book - Memory Jogger 2: Tools for Continuous Improvement and Effective Planning

Introduction to Problem Solving (60 minutes):

- PPT 4-11
- ACTIVITY: Numbers Game (handout) – see notes on PPT slide 8 "Reasons for A3 Problem Solving"

BREAK 15 minutes

A3 Problem Solving is a "Team Activity! (2 hours)

- PPT 12-19
- ACTIVITY: Unstructured brainstorming on "effective team problem solving" (see Memory Jogger 2 book)
- ACTIVITY: 6-3-5 brainstorming on "barriers to effective team problem solving" (see Memory Jogger 2 book)
- ACTIVITY:
    - Identify and list characteristics for effective problem solving roles.
    - Discuss how each role being fulfilled eliminates barriers.
- ACTIVITY: Five Houses

BREAK 15 minutes (or LUNCH, if 8-hour program)

Application to the workplace (3.5 hours)

- PPT 20-33
- ACTIVITY: Select work-related problem, complete steps 1-7
- ACTIVITY: The Albatross
- ACTIVITY: Sash Bonding Case Study
- *Add another 15-minute break during this module*

Review and Next Steps (15 minutes)

- PPT 34
- ACTIVITY: Students complete course evaluations/feedback forms.
- Close and Sign out

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5 House
Team Problem Solving Activity

There are 5 houses. Each of a different color and lived in by men of different nationalities with different vehicles, hobbies and favorite foods.

1. The Chinese man lives in the green house.
2. The Hungarian man drives a Camaro.
3. The fisherman lives in the brown house.
4. The Spanish man likes bowling.
5. The brown house is immediately to the right of the purple house.
6. The man who likes chicken drives a van.
7. The man in the orange house likes ice cream.
8. The man in the middle house plays darts.
9. The English man lives in the first house on the left.
10. The man that likes pizza lives next to the man who drives a pick-up.
11. The man who likes ice cream lives next to the house that drives a station wagon.
12. The man who likes pasta also likes to hunt.
13. The Japanese man likes seafood.
14. The English man lives next door to the red house.

Determine who plays golf and who drives a Corvette.

A_3 Problem Solving
MSSC CPT Quality

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Trainer/Instructor's Name (Print) MARTIN BROOK GILREATH

Trainer/Instructor's Signature _____

BCI Customer _____

Today's Date: 9-21-2016

Handouts: Per Participant

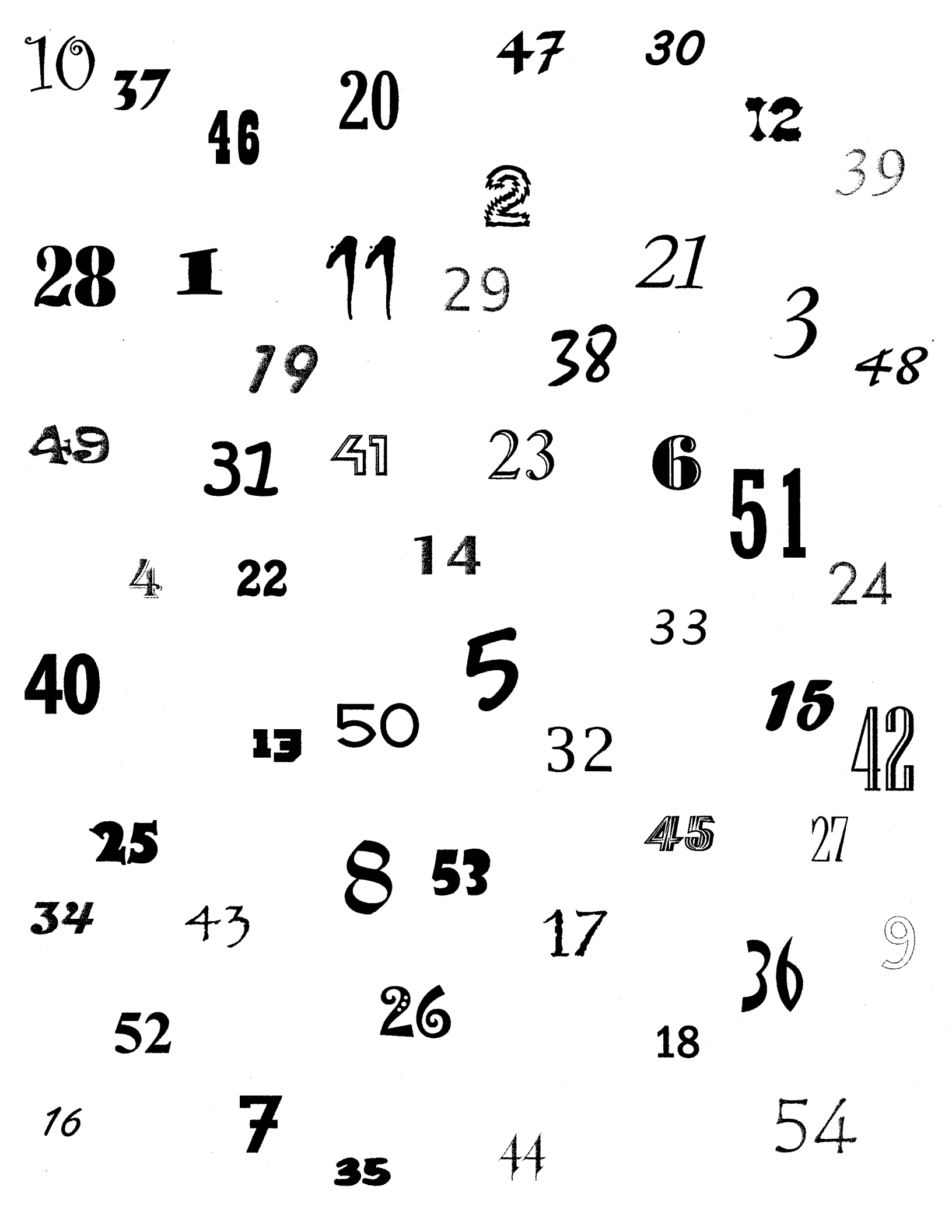
- Numbers Game
- 5 House
- Albatross
- Sash Bonding
- Student PowerPoint Guide (manual)

Materials: Per Participant

- Pencils
- Erasers
- Graph Paper
- 12 inch rulers
- Calculators
- Memory Jogger – Continuous Improvement II - The Memory Jogger 2: Tools for Continuous Improvement and Effective Planning from Amazon
- BCI Paperwork
- Dictionaries (only need 5)

Video:

From YouTube – Cost of Quality and David Marquette, Submarine Captain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PROBLEM SOLVING
for PRODUCTION

Problem Solving for Production
Course Description

Using A3 Problem Solving techniques, this is an activity based, 8-hour course intended to showcase the power and utility of this process improvement system.

Participants will learn and apply a consistent and comprehensive process using a variety of activities, case studies and work related problems.

Course Objectives

As a result of this course participants should be able to:

- Explain why continuous improvement is needed and why it is easier said than done
- List advantages of A3 Problem Solving and describe how it is used to eliminate waste and reduce variation
- Distinguish between value added and non-value added activities
- Apply A3 thinking along with basic quality tools (cause & effect, multi-voting, process flow, pictograph, Pareto, run chart, 5-why, scatter diagram, histogram, etc.) to solve problems

What is a Problem?

A problem is:

- An event where requirements (external or internal customer) are not being met.
- An unforeseen occurrence or event.

What is Problem Solving?

- Elimination of the cause of a nonconformity, potential nonconformity or other undesirable condition in order to prevent its occurrence or recurrence.

What is an A3?

- An A3 is a **one-page story** about the logical thinking process to “grasp the situation”.
- Helps everyone within the organization see the process clearer, leading to more effective improvement.
- Types of A3:
  - Problem solving ← Focus of this presentation
  - Proposal
  - Status
- Based on the Plan, Do, Check, Act (PDCA)

A3 Problem Solving

When to use A3

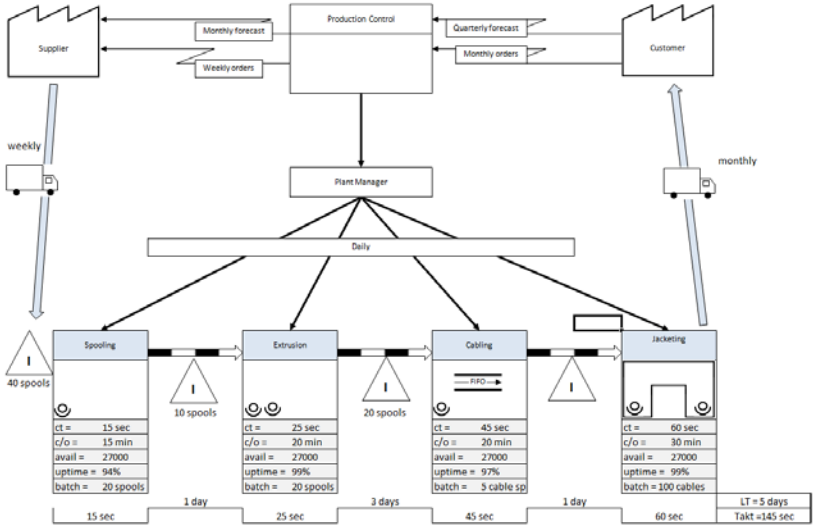
- Anytime you desire to clearly tell a story – especially when you wish to simplify or clarify a complicated story

Why use A3

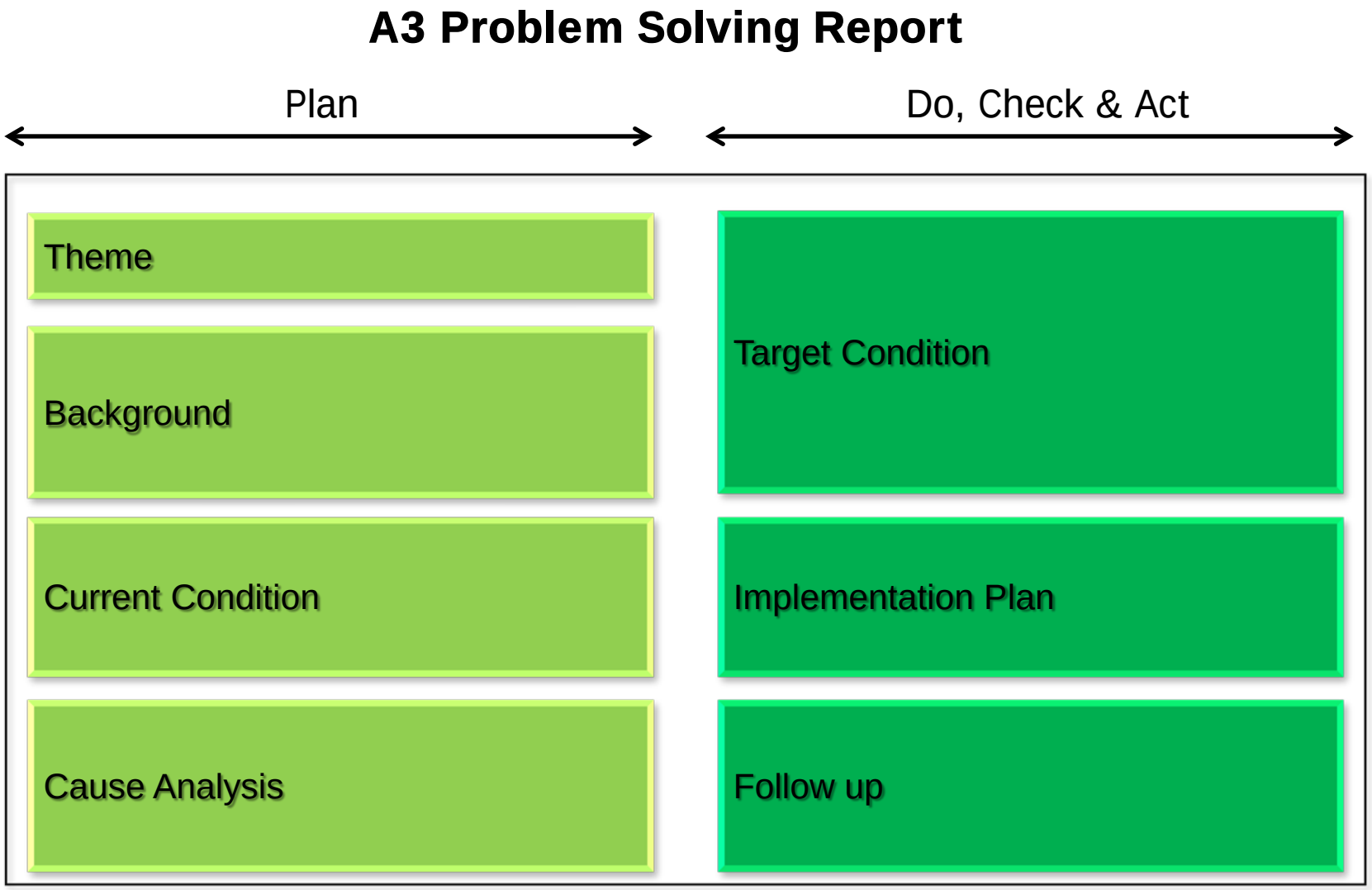
- Improves logical thinking and decision making
- Promotes consistency for better communication
- Alleviates overburden, eliminates waste and reduces variation

Reasons for A3 Problem Solving

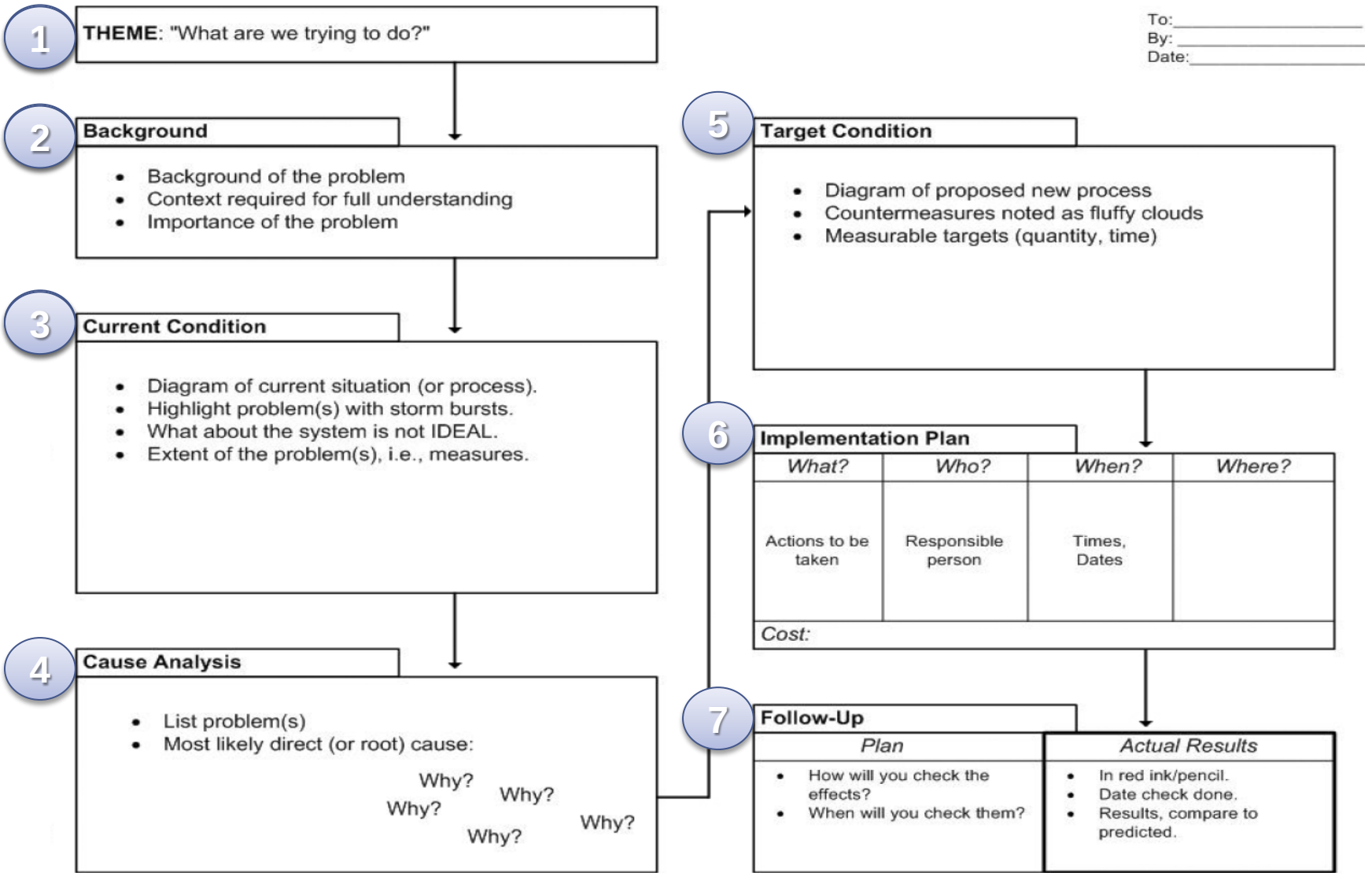
- Allows your story flow in a logical sequence by including only points needed to tell the story.
- Uses fewer words and more graphs and visuals to tell your story.



Relationship Between A3 & PDCA

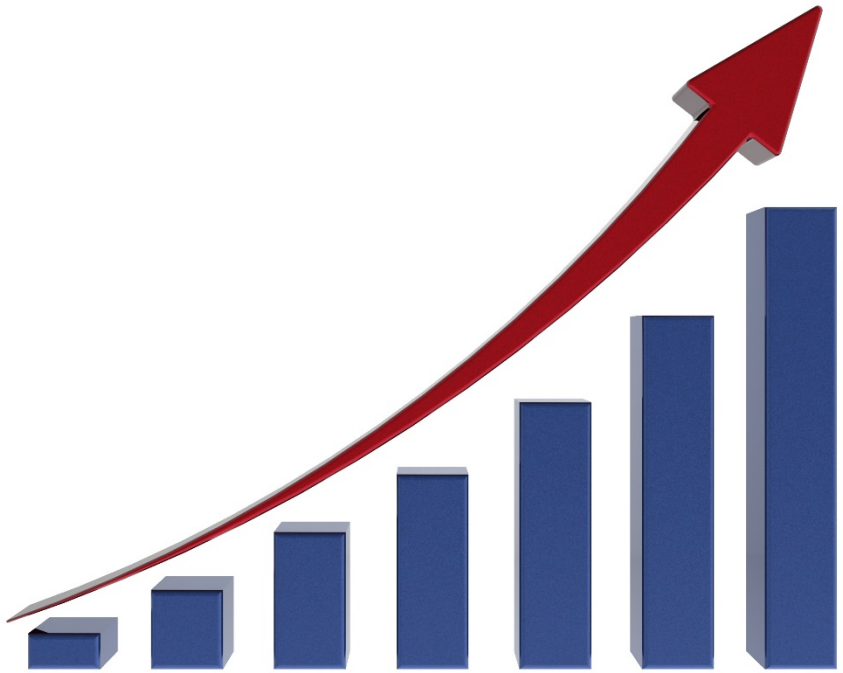


A3 Storyboard Layout



Benefits of A3 Problem Solving

- Increased customer satisfaction
- Increased market share
- Lower costs
- Faster delivery tin
- Increased profitab
- Increased efficien
- Improved morale



A3 Problem Solving is a “Team” Activity!

- Team norms
- Team roles (champion, team leader, facilitator, recorder, team member)
- Stages of Team Development (form, storm, norm, perform)

The 4 Rules in Use

Rule 1: <u>Activities</u> (all activities of work in a process)

- Clearly specified by:
  - Content (what the work is)
  - Sequence (in what order should it occur?)
  - Timing (about how long should it take?)
  - Outcome (what result is clearly expected?)

Questions…

- Is it clear what should happen, and what order, and in what approximate time frame?
- Is every step in the process adding value to the customer?
- Is the participation of every person who touches the process necessary?
- Does everyone who uses this process perform it the same way?
- How does a new worker learn this process?
- How did you learn this process?
- Approximately how long should the process take to complete?
- Is the expected outcome clearly understood?

Answers to these kind of questions illuminate strengths and weaknesses of the process and contribute to ideas for redesigning the work.

Negative Keywords

- Listen for the negative keywords that quickly become like fingernails on a blackboard-the ones that point clearly to an inconsistent and unreliable process. Here are a few of those words: *sometimes, maybe, if, it depends, possibly, perhaps,* and the classic answer to "*why do we do it this way*?" Which is, of course, "*because we've always done it this* way!"

The 4 Rules in Use

Rule 2: Connections

- Direct communication between two people… (think of making a request)
  - Direct (no middle man in the request)
  - YES / NO answer (no “maybes”)

The 4 Rules in Use

Rule 3: Pathways

- Steps in delivering the requested product or service
  - Simple (involving as few steps and people as necessary)
  - Direct

The 4 Rules in Use

Rule 4: Improvement

- Direct response to a problem
- As close to the problem as possible
- As an experiment
- By those doing the work
- Supported by a coach

A3 Thinking Throughout the Organization

- Management Challenges
  - Top down decision delegation to coaching and approving
  - Persistent reverence for employees
- Specificity of A3 Problem Solving
  - Address issues quickly
  - Focus on specific, significant problems
- Adapting to Change
  - A3 is really about adapting to change
  - Internal changes, administrative changes, regulatory changes
- Observation
  - The keystone to success
  - Depends on adequate preparation and inclusion of applicable workers

Step 1: Theme

- Every report begins with a title that introduces the content to the audience.
- The theme should help the audience quickly discern the gist of the content. In essence, **the theme is the report or document description**.
- Examples include:
  - Reducing errors in production
  - Improving employee retention rate
  - Reducing delivery time
  - Improving server uptime

Step 2: Background

- Document important background information that is essential for understanding the **extent and importance of the problem**.
- You must be **aware of your audience**, including their background and information needs.
- If the background is not clear, the audience may not understand what the report is about, resulting in wasted time explaining what the presentation or report is trying to accomplish.

Step 2: Background - Review Questions

- Is there a clear theme for the report that reflects the content?
- Is the topic relevant to the organization's objectives?
- Is there any other reason for working on this topic (e.g., learning purposes)?

Step 3: Current Condition

- This section is perhaps the most important in the A3 report. The objective is to frame the current condition in a **simple way** for the reader or audience to understand.
- In it, the author draws a **visual representation** that depicts the **critical elements** of the system or process that produced the problem.
- This should involve the use of **charts, graphs, tables** or other techniques to depict the current condition while avoiding straight text summaries or bulleted points.

Step 3: Current Condition

- A good A3 report paints a clear picture of what is going on and does not simply summarize qualitative opinions.
- In this section, the author takes time to investigate the facts of the situation and portray them in a **visual manner** that is helpful to the audience for comprehension.
- The chief goal of the current condition is to provide the audience with a **simple** (but not simplistic!) **overview of the current process** and demonstrate a fact-based understanding of the problem.

Goal Statement

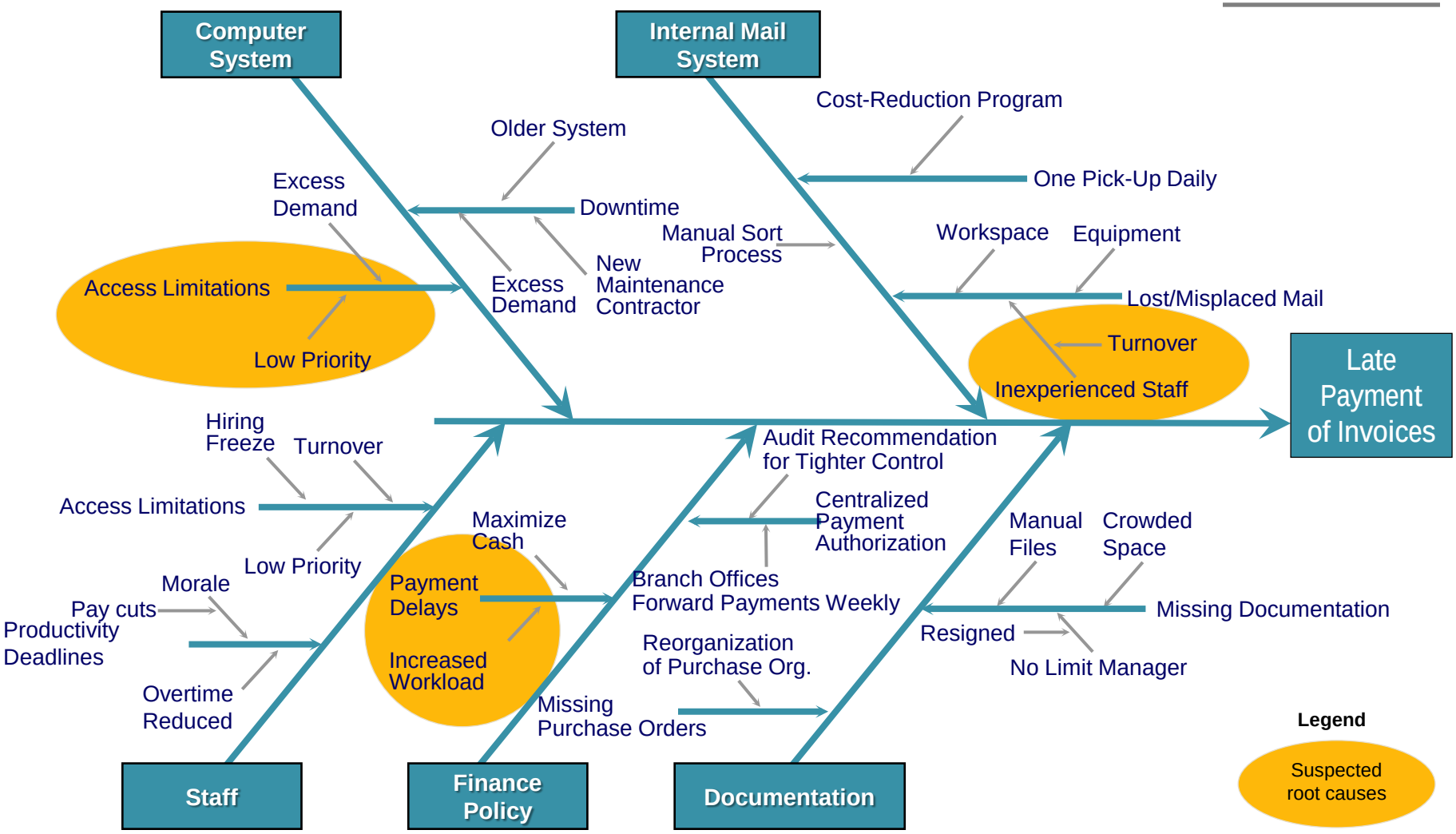
- Specify a goal to address the gap or target state from the current state.
- Be ***S.M.A.R.T.*** when setting the goal:
  - **S**pecific
  - **M**easurable
  - **A**chievable
  - **R**ealistic
  - **T**imely

Step 4: Root Cause Analysis

- The report author should continue with the investigation of the current condition until the **root cause** of the **problem symptoms** identified in the current condition diagram is uncovered.
- Failing to address the deeply rooted seed of the problem means it will likely recur.
- There are two common methods for root cause analysis:
  - Cause and effect diagram (a.k.a. fishbone diagram)
  - 5 Whys

Example: Cause and effect diagram used in solving the problem of “Late Payment of Invoices”

ILLUSTRATIVE



Example of 5 Whys

ILLUSTRATIVE

	Why?	Answer
1	Why is there oil on the floor?	Oil leaks from the cylinder rod when activated.
2	Why did oil leak?	The O-ring was cut.
3	Why was the O-ring cut?	The rod was flawed.
4	Why was the rod flawed?	Dirt in the oil abrades the rod.
5	Why did dirt get in the oil?	There are holes and gaps on the upper plate of the tank.

Root cause of the problem

Step 5: Target Condition

- After root cause analysis, the problem solver should have a deep understanding of how the work currently gets done and a good grasp of the root cause(s) of the problems experienced with the system.
- He/She is now ready to consider how the system might be improved.

Step 5: Target Condition

- Countermeasures address the root cause(s) while conforming to lean design principles.
- The goal is to move the organization closer to an ideal state of providing exactly what the customer needs, safely, when needed, in precisely the right quantity and without waste.

Step 6: Implementation Plan

- Make sure to address the potential root cause(s) with action items.
- Identify who will implement the countermeasures.
- Make it clear exactly what will be done.
- Clarify the due date by which action items will be completed.
- Make the implementation order and location clear.

Step 7 : Follow Up

- Standardize the countermeasures.
- Share success story. Determine best practices and other learning points.
- If project was unsuccessful, address the causes to prevent them from recurring. Loop back to previous stages to correct and repeat actions.
- Document the success story.
- Celebrate the success.
- Plan for future projects.

Case Study

Thank you

- Welcome participants to class
- Complete required paperwork
- Logistics

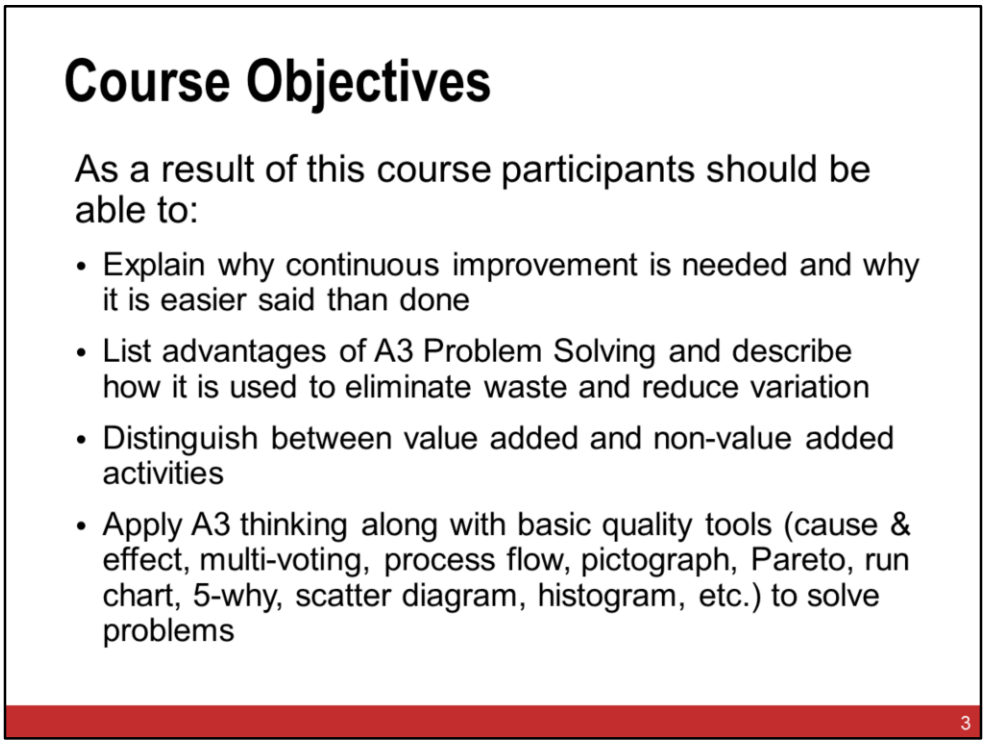
Activity: Participant introductions

Course Description

- A3 Problem Solving is an activity based 8-hour course intended to showcase the power and utility of this process improvement technique. Participants will learn and apply a consistent and comprehensive process using a variety of activities, case studies and work related problems.

2

Review: Course description



Review: Course objectives

Activity: Continuous improvement – Have volunteer write name on board 5 times and track time – Do this a second time and only have them write every other letter. Create trend chart and debrief

Review: L.E.A.R.N. Adult learn best when training is light and lively, experienced based, activity based, relevant content, using numerous methods

Review: Lean versus mass production, DOWNTIME (Waste), Concept of variation, Muri, Mura, Muda, the pond

Activity: Memory Jogger II – Take a short tour

What is a Problem?

A problem is:

- An event where requirements (external or internal customer) are not being met.
- An unforeseen occurrence or event.

4

Review: What is a problem?

What is Problem Solving?

- Elimination of the cause of a nonconformity, potential nonconformity or other undesirable condition in order to prevent its occurrence or recurrence.

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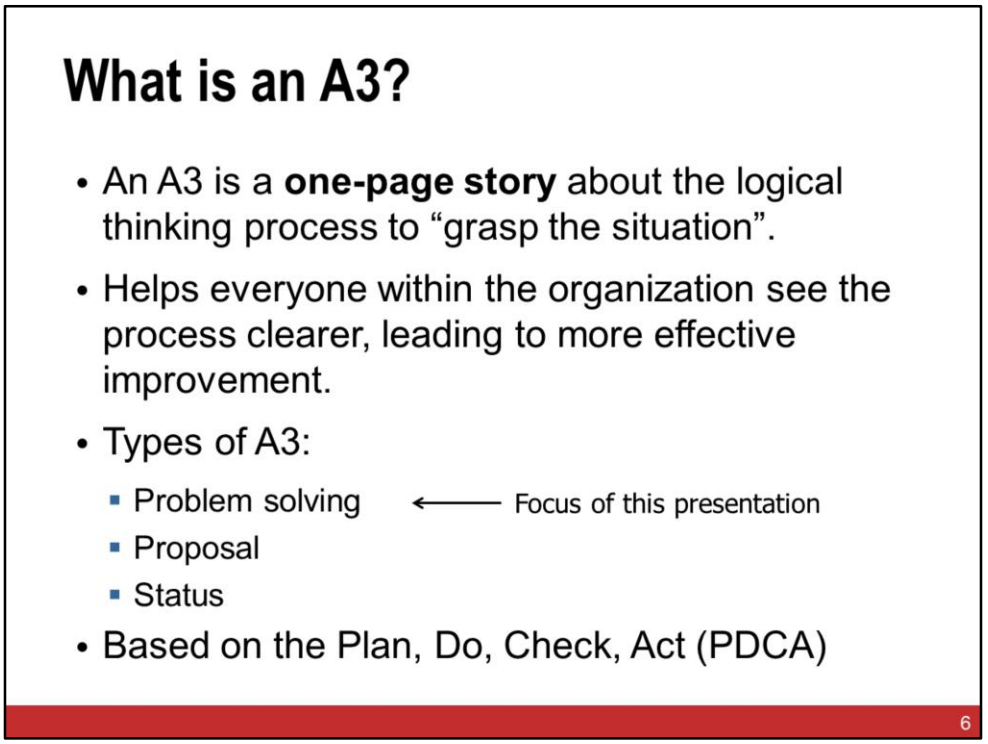
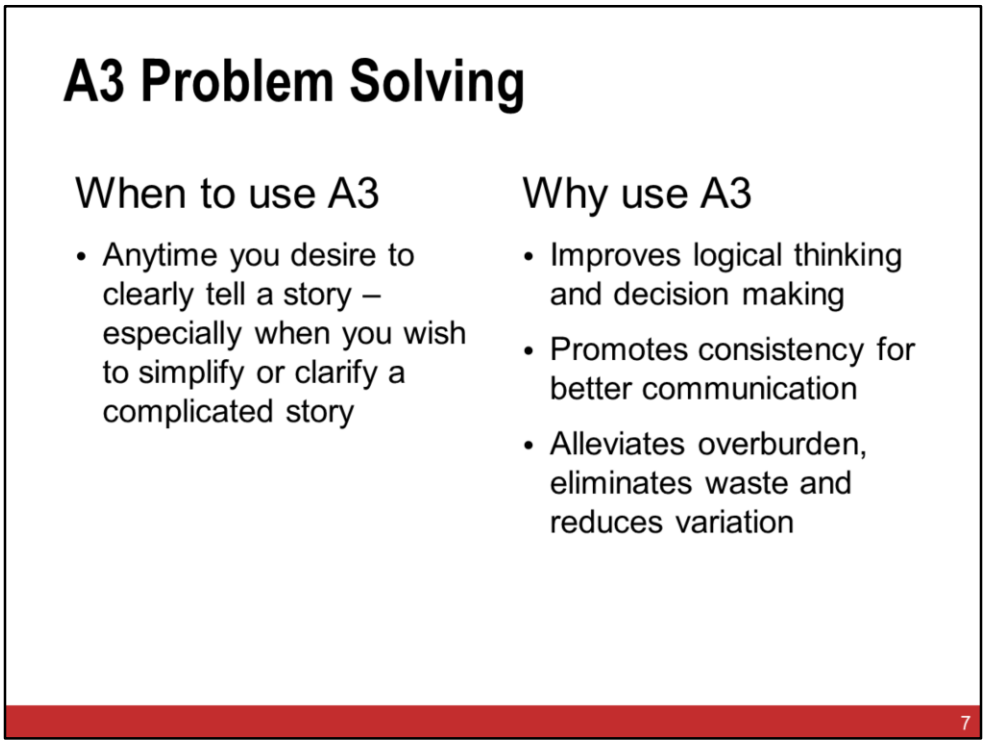
Review: What is problem solving?



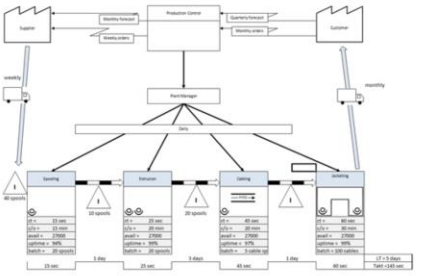
Review: What is an A3?



Review: A3 problem solving

Reasons for A3 Problem Solving

- Allows your story flow in a logical sequence by including only points needed to tell the story.
- Uses fewer words and more graphs and visuals to tell your story.



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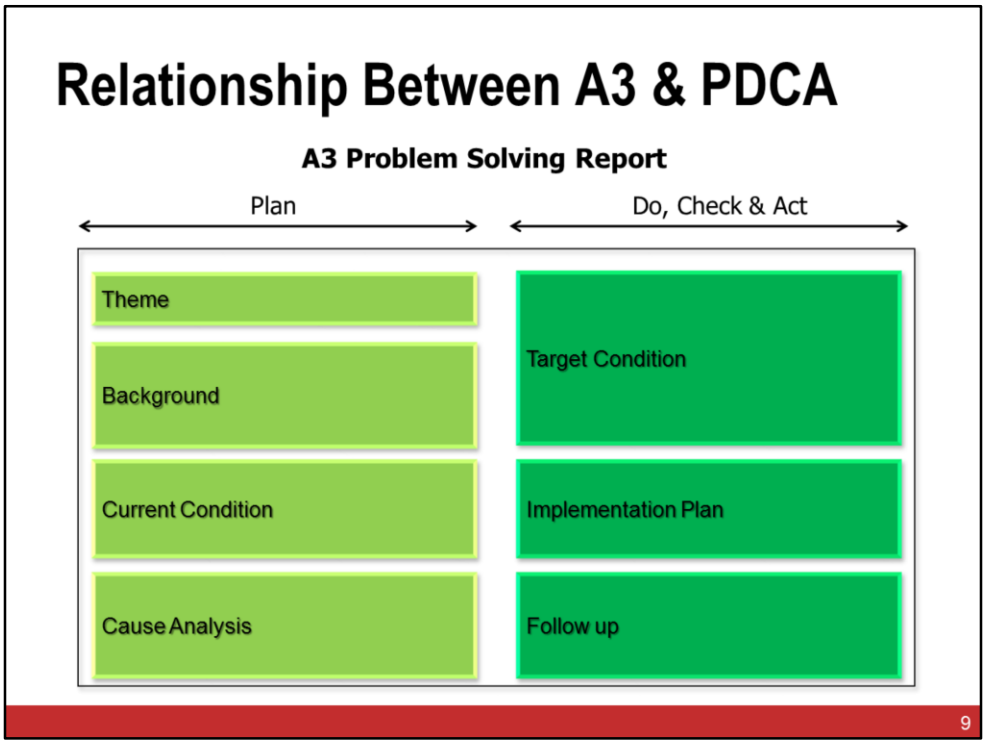
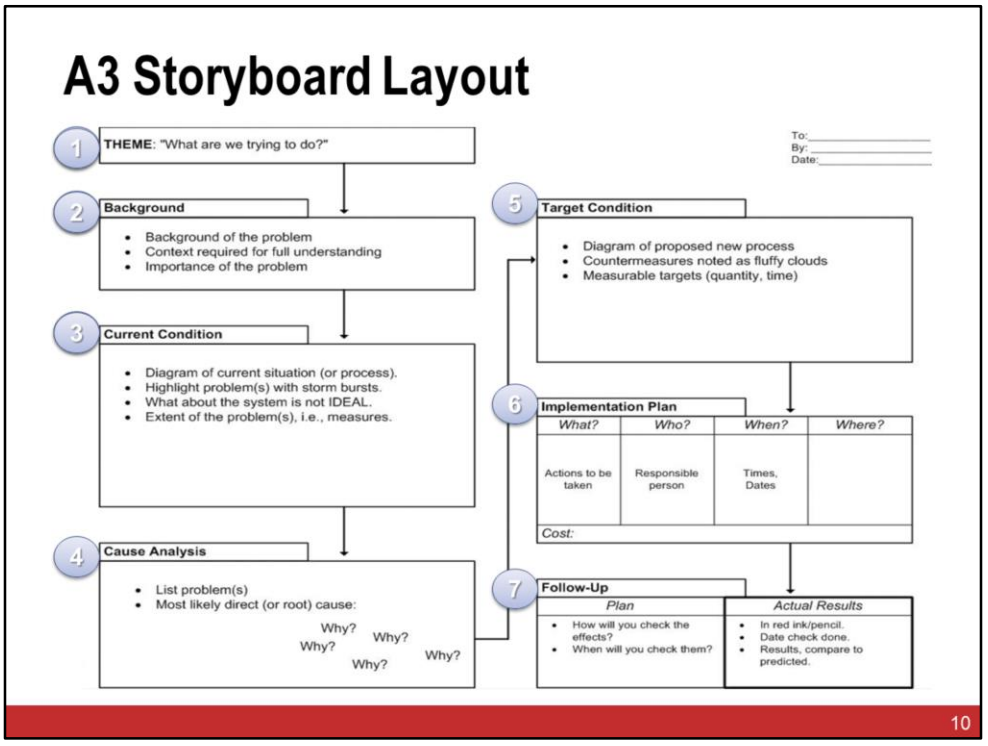
Review: Reasons of A3 problem solving

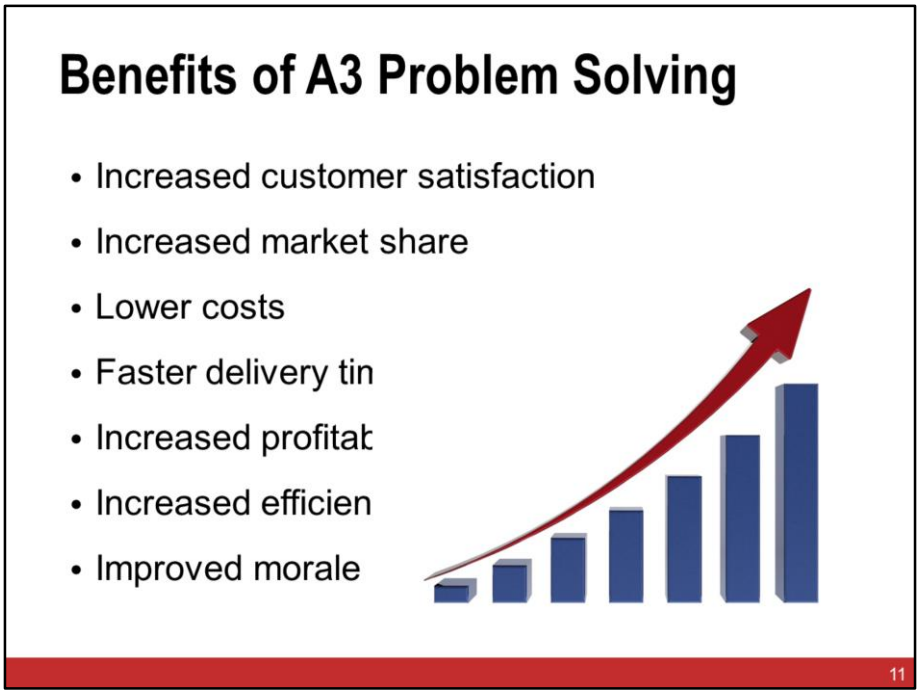
Activity: Numbers



Review: Relationship between A3 & PDCA



Review: A3 storyboard layout



Review: Benefits of A3 problem solving

A3 Problem Solving is a "Team" Activity!

- Team norms
- Team roles (champion, team leader, facilitator, recorder, team member)
- Stages of Team Development (form, storm, norm, perform)

12

Activity: Use unstructured brainstorming on "effective team problem solving" (see Continuous Improvement Memory Jogger II)

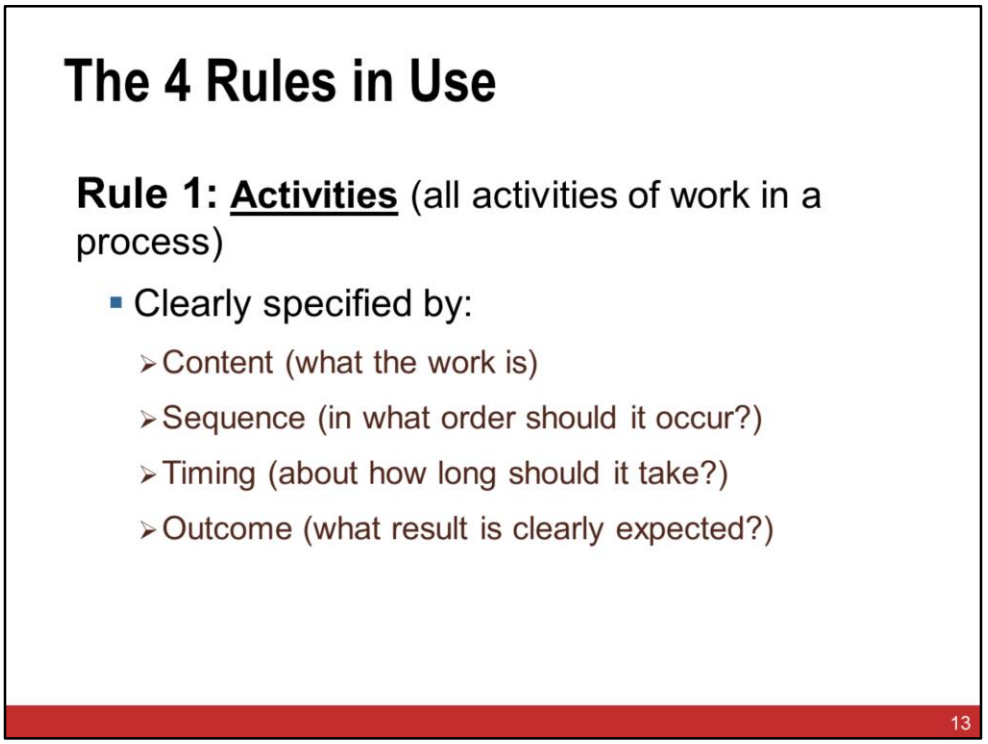
Activity: Use 6-3-5 brainstorming on "barriers to effective team problem solving" (see Continuous Improvement Memory Jogger II)

Activity: Identify and list characteristics for effective problem solving roles, discuss how each role being fulfilled eliminates barriers

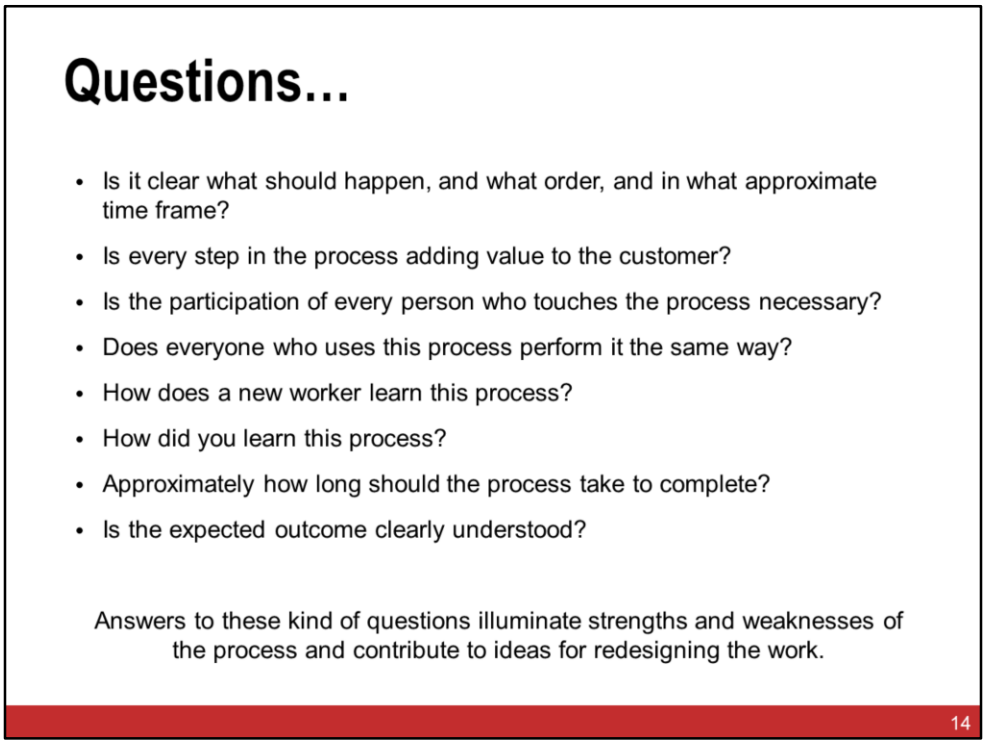
Review: A3 problem solving

Team norms

- Don't blame others
- Describe not judge
- Speak with facts and data
- Concentrate on the vital few and not the trivial many
- Build on proposals or ideas
- Recognize that feelings affect team meetings
- Treat the next process as your customer



Review: Slide



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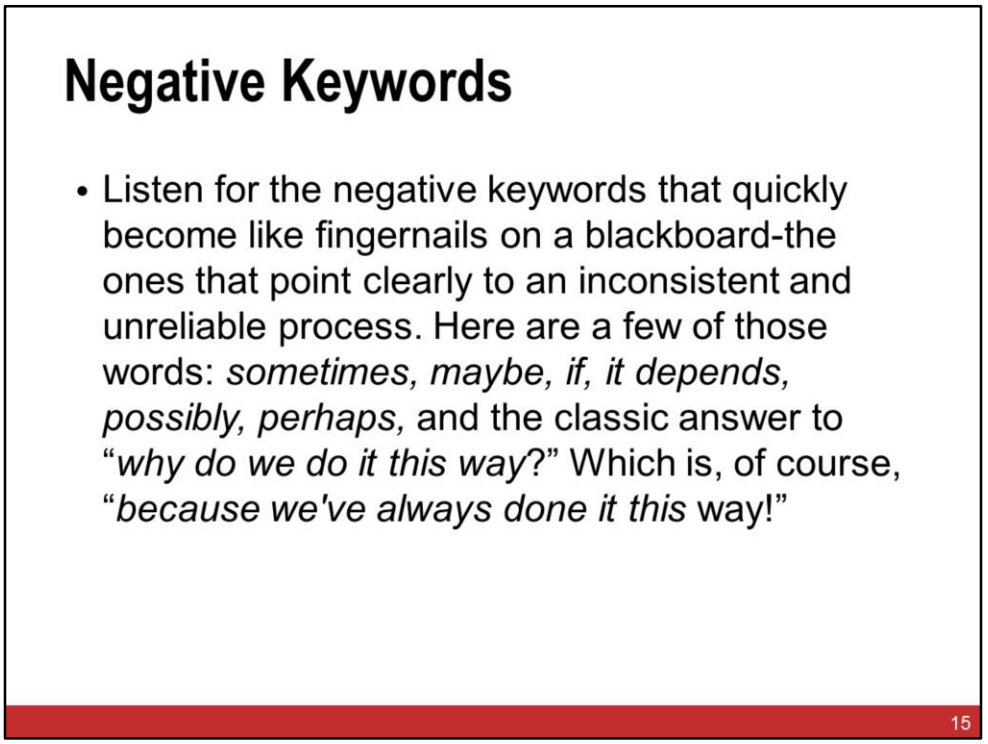

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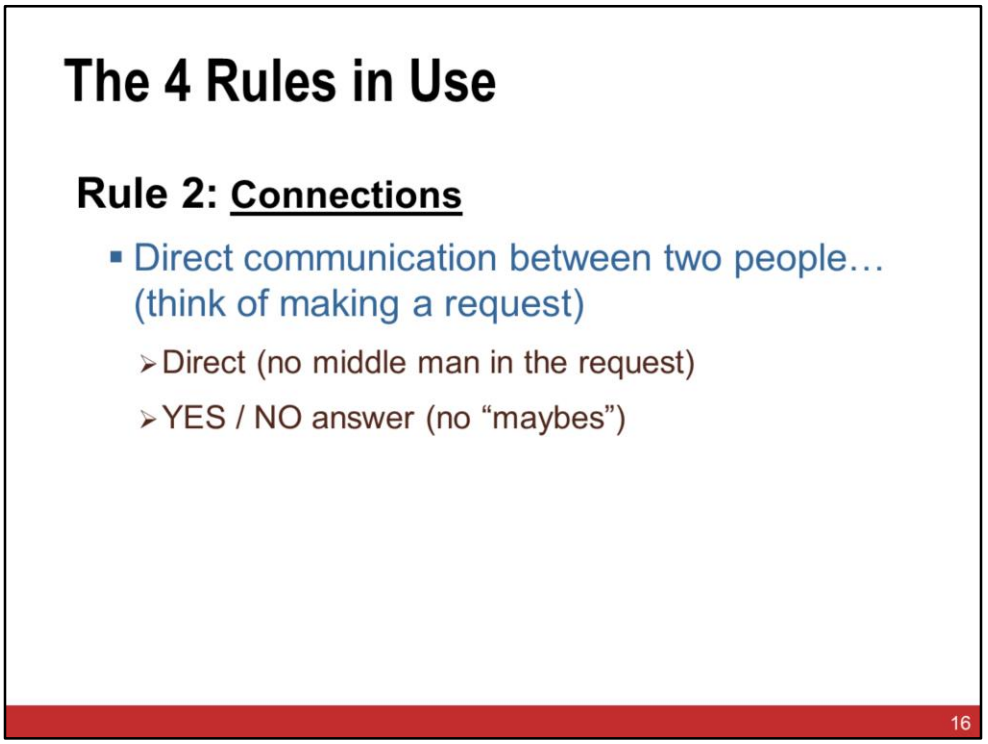

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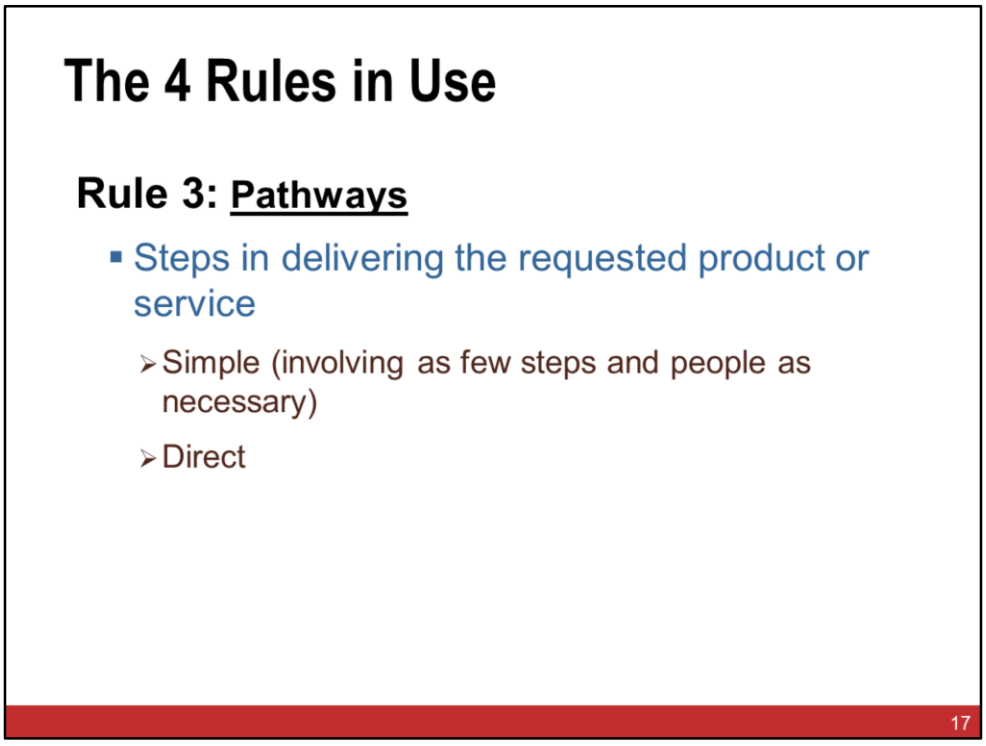

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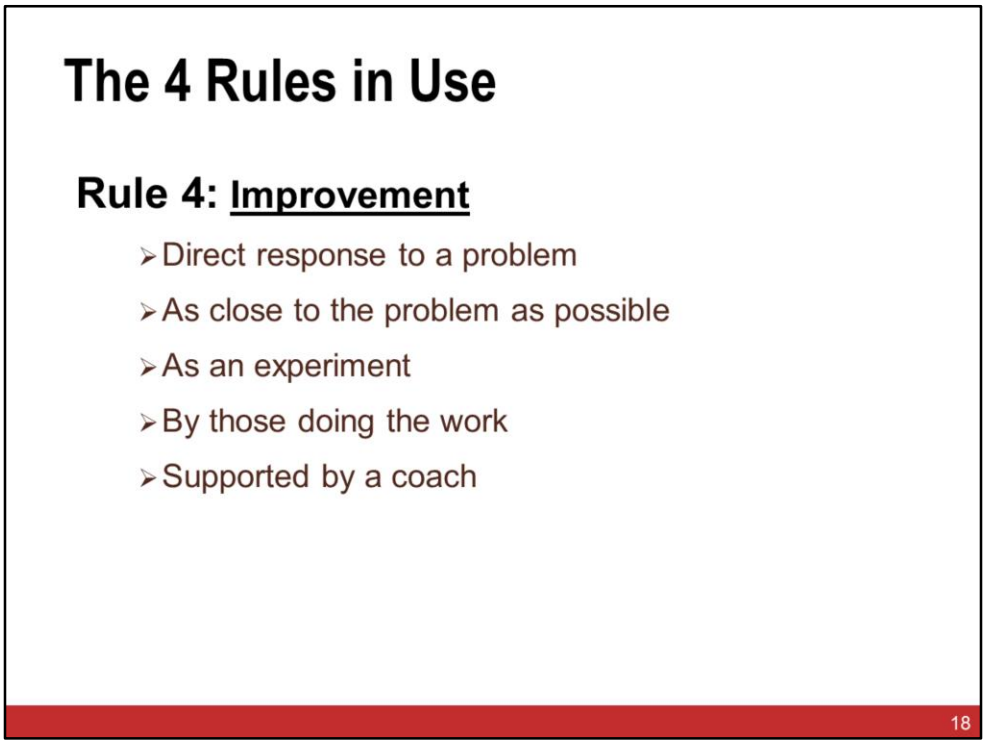

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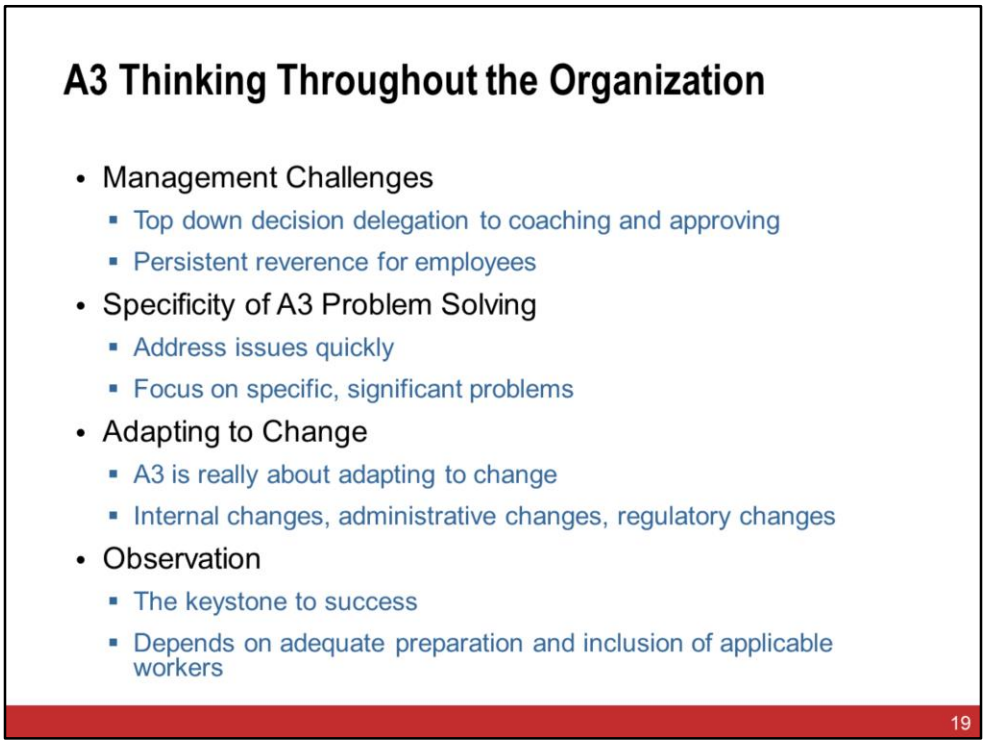
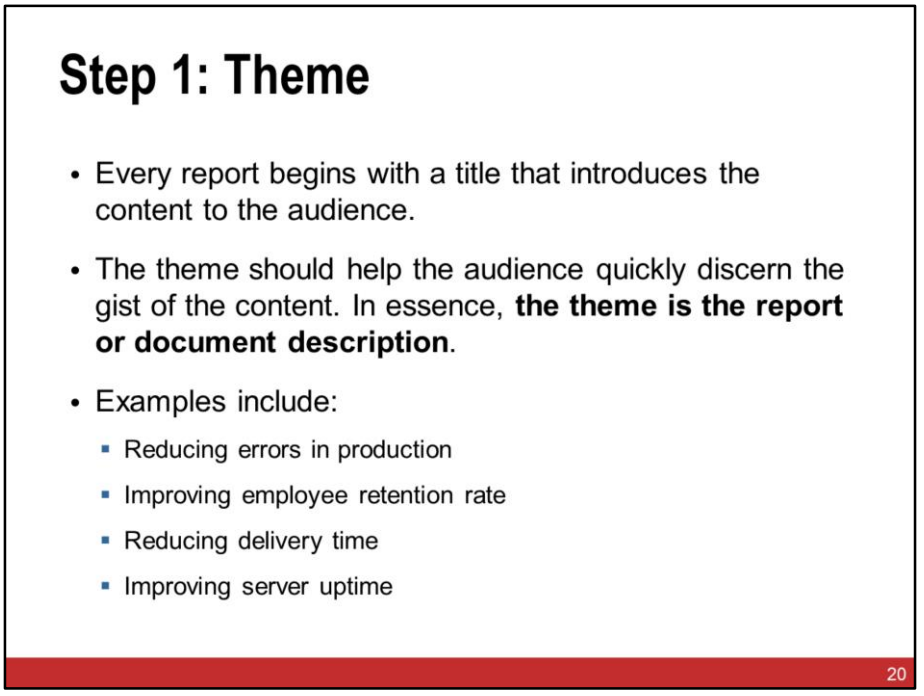


Review: Slide

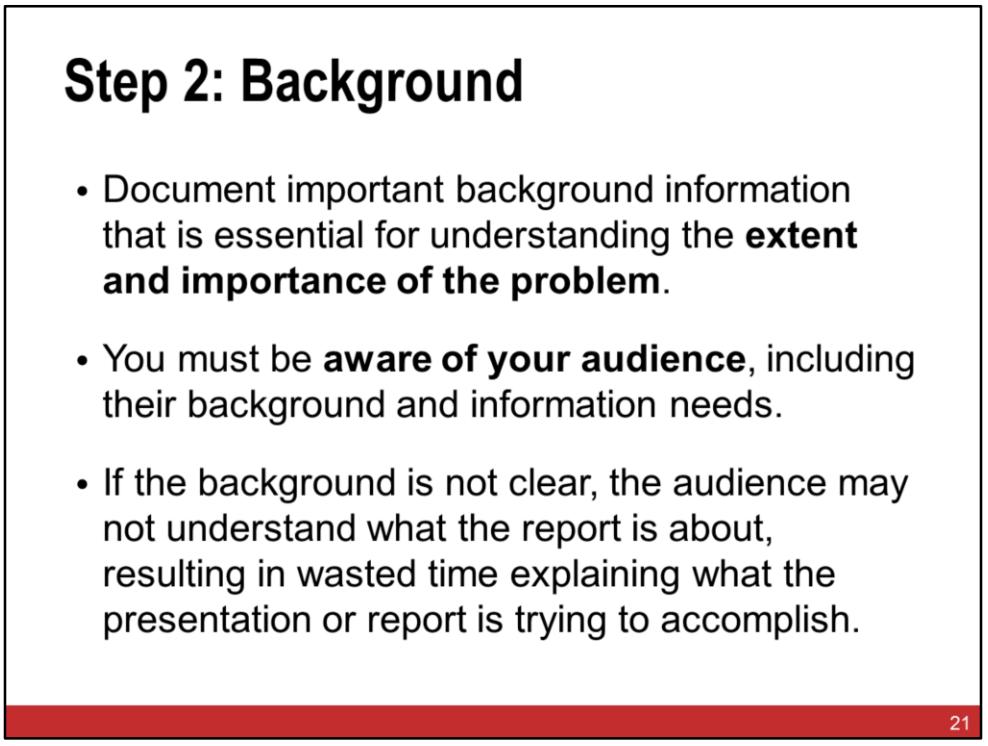
Activity: Five Houses



Review: Step 1: Theme

- Problem identification is the first step in problem solving.
- Problems can be identified by reviewing existing key measurements to look for poorly performing processes.
- Another way to identify problems is to identify customers (internal or external), their requirements and satisfaction with current process. Whenever you are not sure, always ask your customers!

Activity: Select work related problem, complete step 1

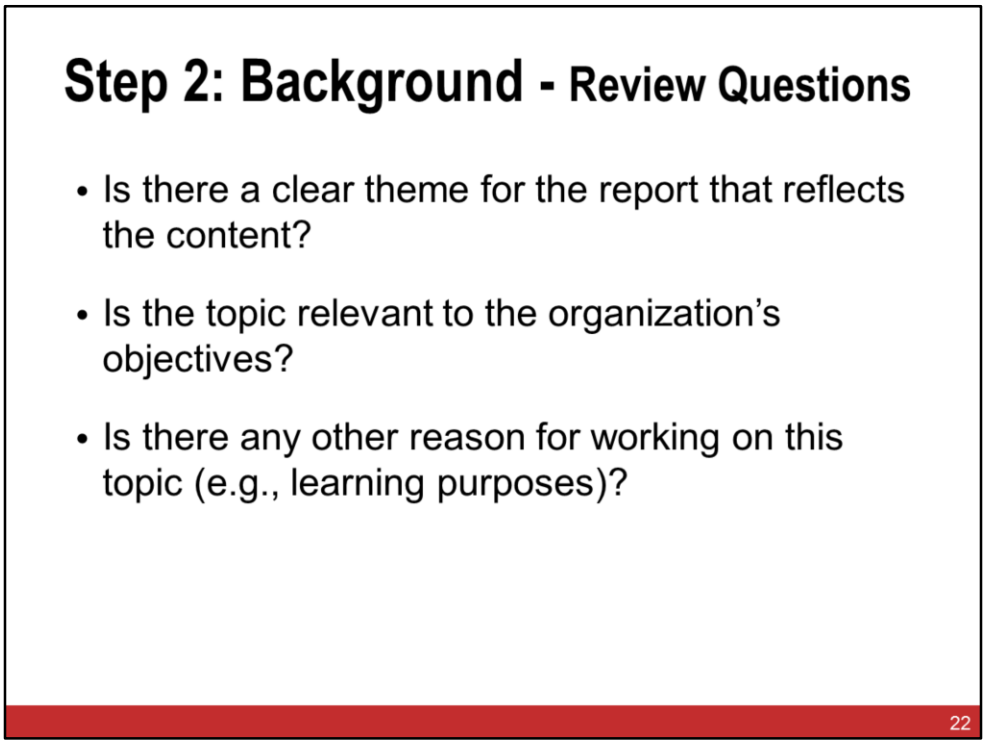


Review: Step 2: Background

- Document important background information that is essential for understanding the **extent and importance of the problem**.

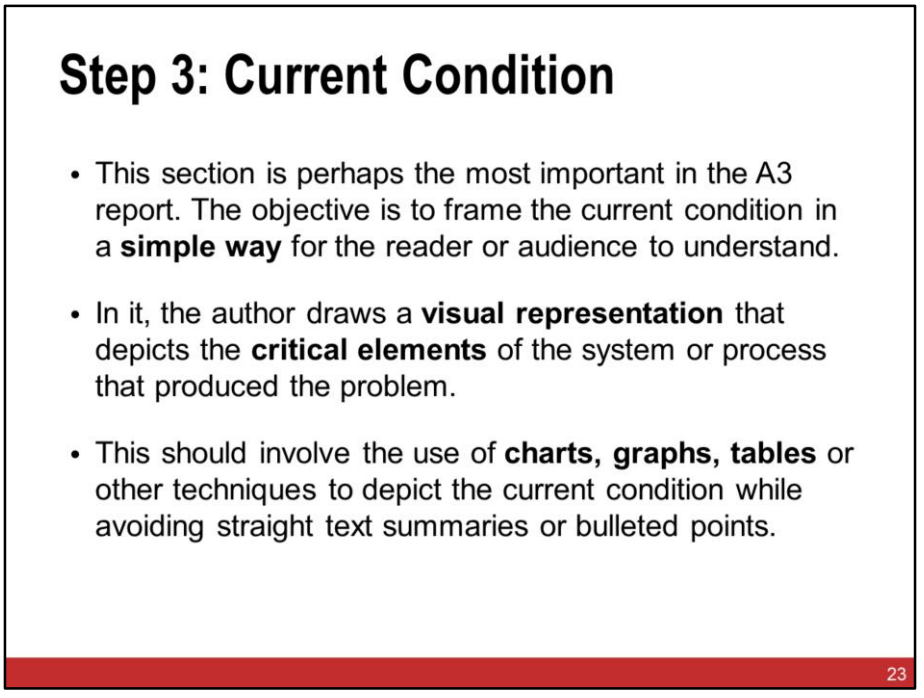
- You must be **aware of your audience**, including their background and information needs.

- If the background is not clear, the audience may not understand what the report is about, resulting in wasted time explaining what the presentation or report is trying to accomplish.



Review: Slide

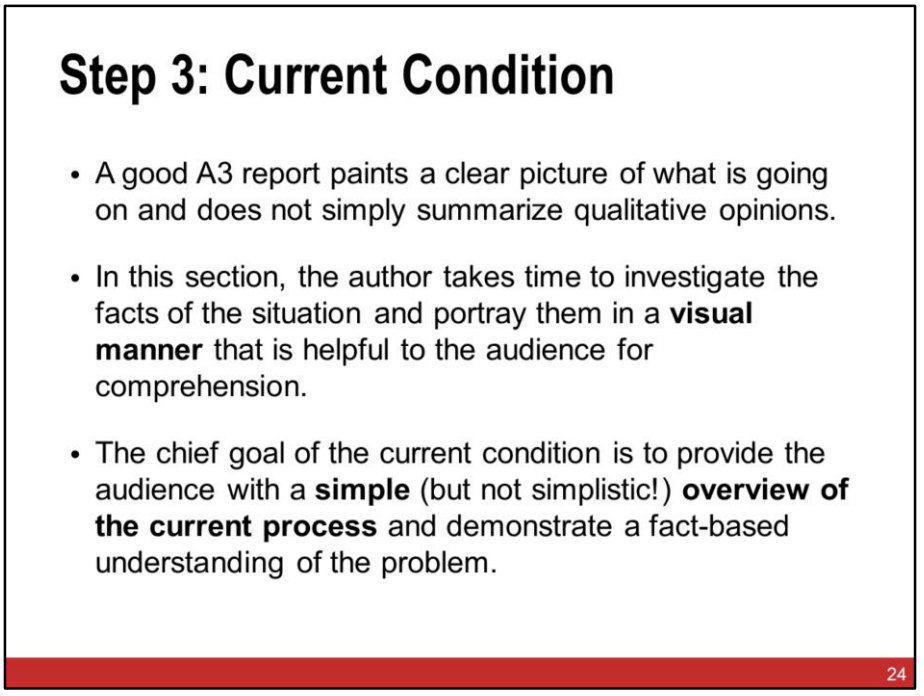
Activity: Select work related problem, complete step 2



Review: Step 3: Understand Present Situation

- Instead of describing the problem in words, the process generating the problem(s) should first be drawn up and presented as a form of a flowchart. This process is called flow-charting or process mapping. By putting the process down on paper, everyone can focus and see what is actually happening.

- The team should then state clearly the problem, the project objective and the scope of the project.



Review: Slide

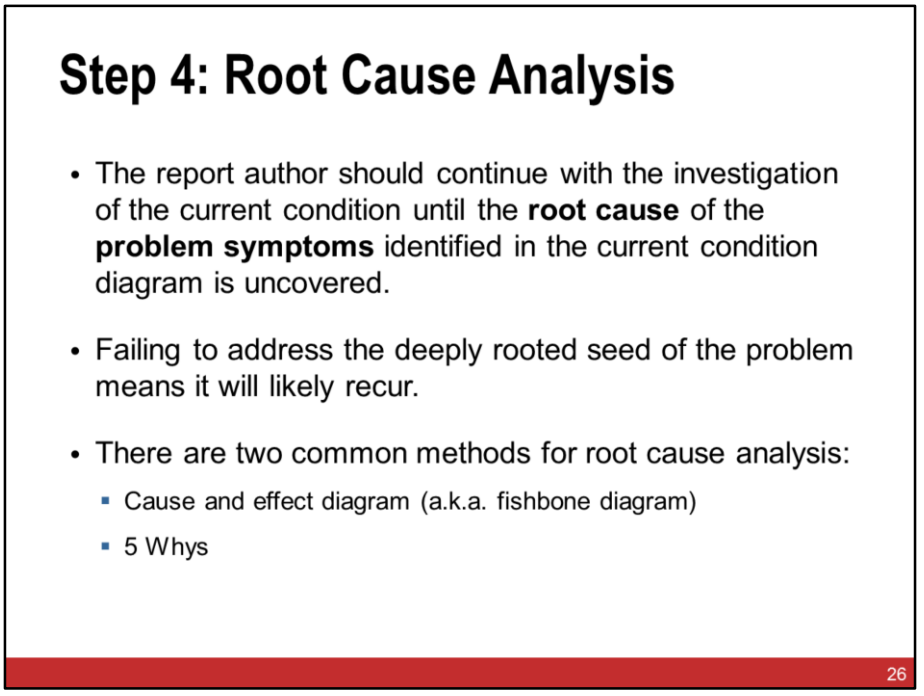
Activity: Select work related problem, complete step 3

Goal Statement

- Specify a goal to address the gap or target state from the current state.
- Be ***S.M.A.R.T.*** when setting the goal:
  - **S**pecific
  - **M**easurable
  - **A**chievable
  - **R**ealistic
  - **T**imely

25

Review: Slide



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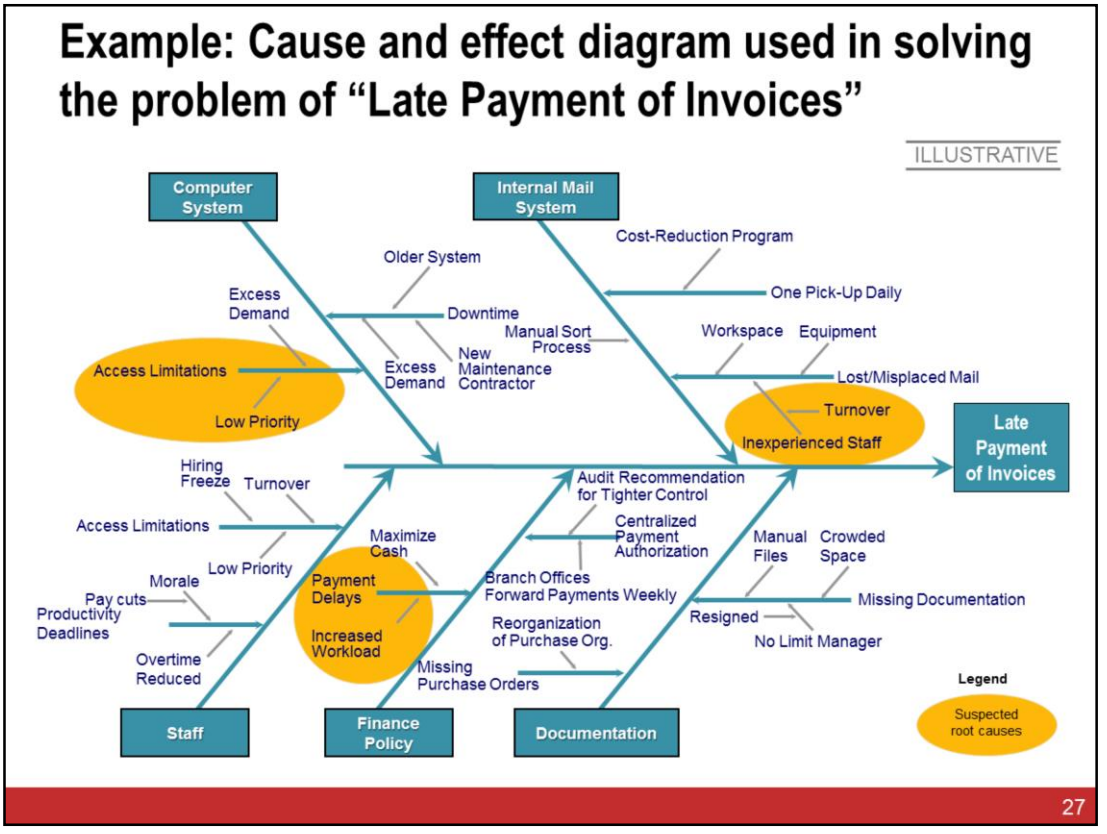

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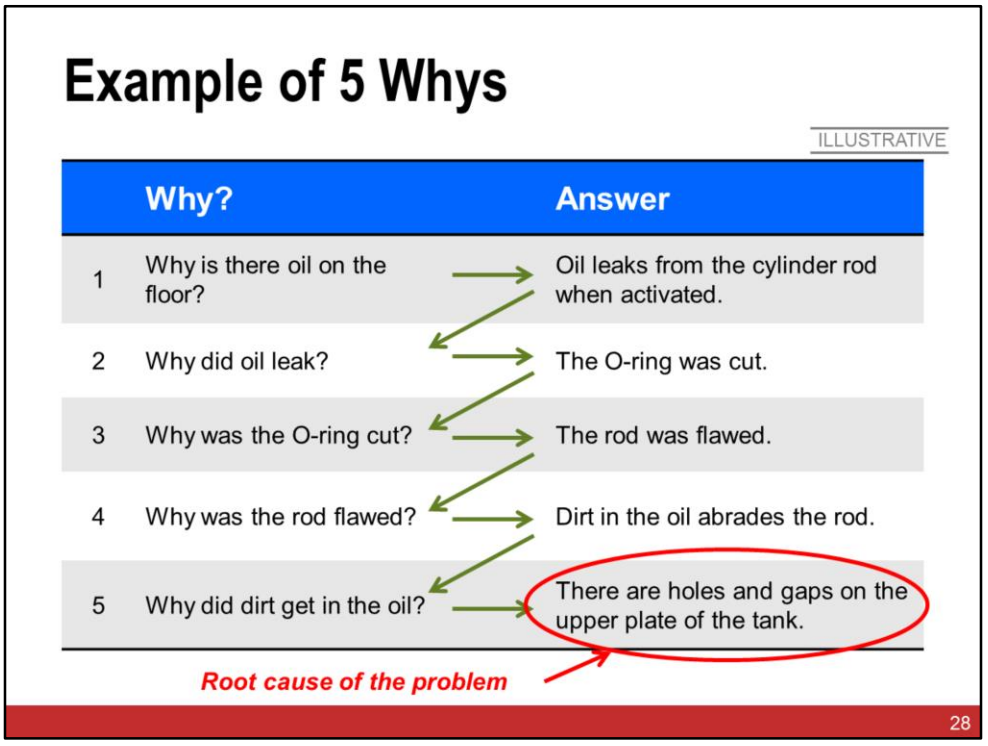
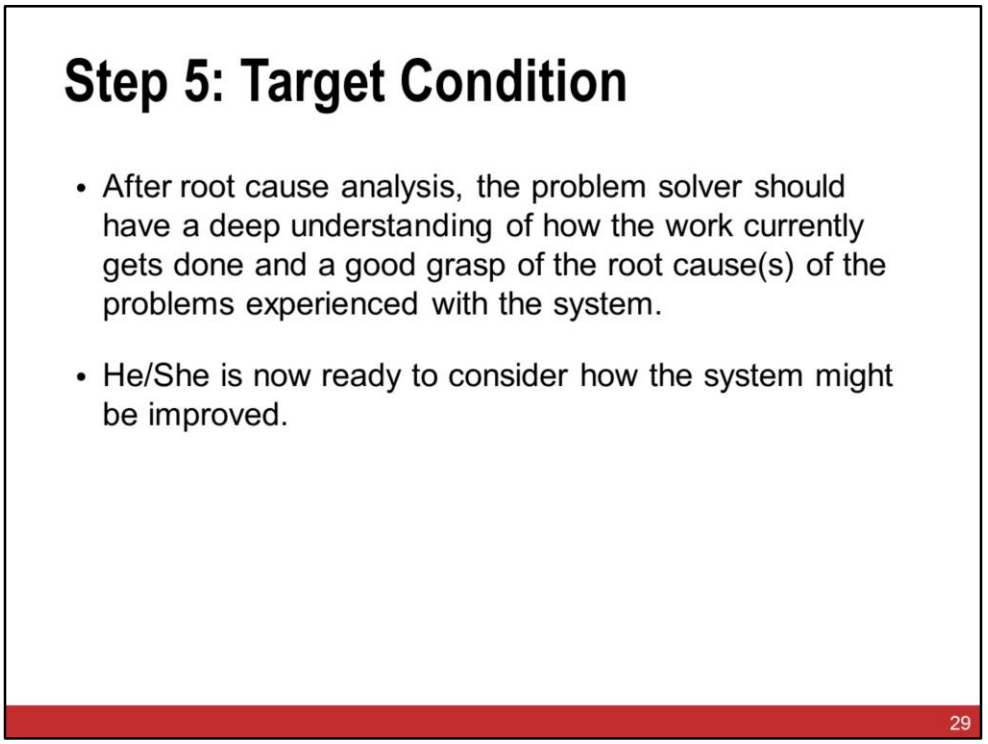


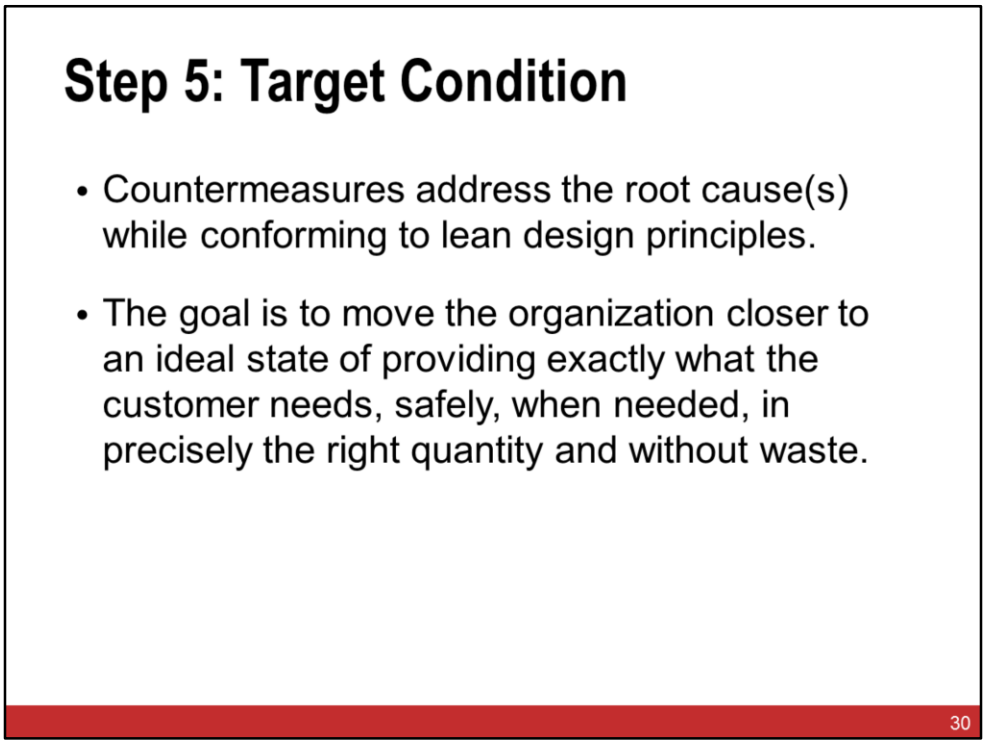
Review: Slide

Activity: Select work related problem, complete step 4



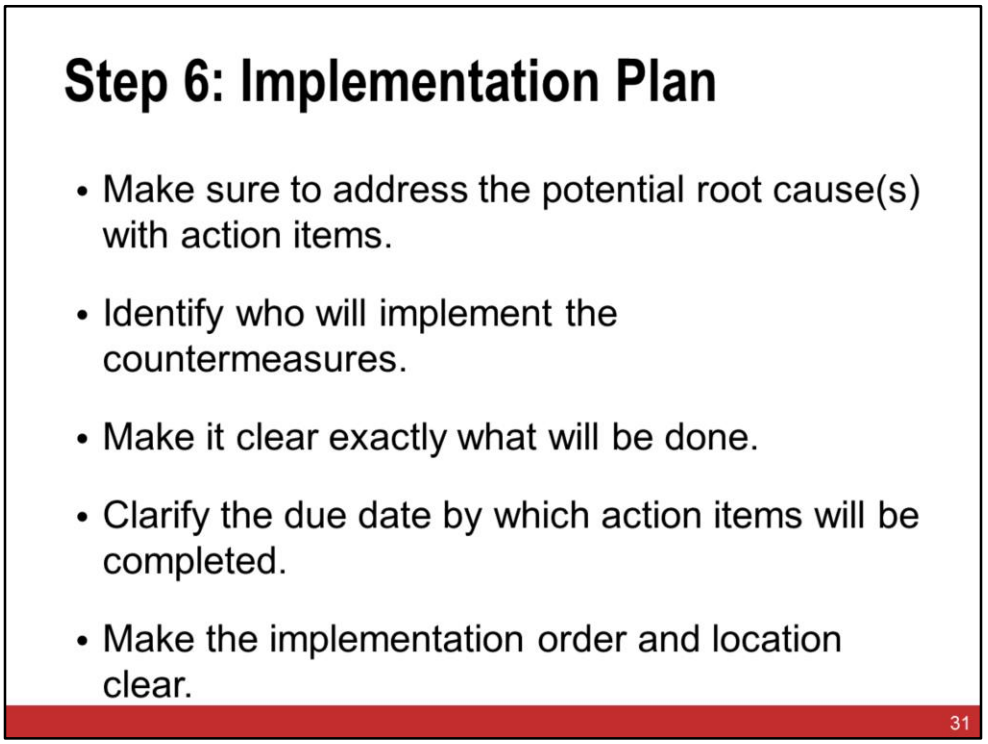
Review: Step 5: Target Condition

- Instead of describing the target condition in words, the solution should first be drawn up and presented as a form of a flowchart. By putting the process down on paper, everyone can focus and see what is actually happening.
- The team should then state clearly the countermeasures.



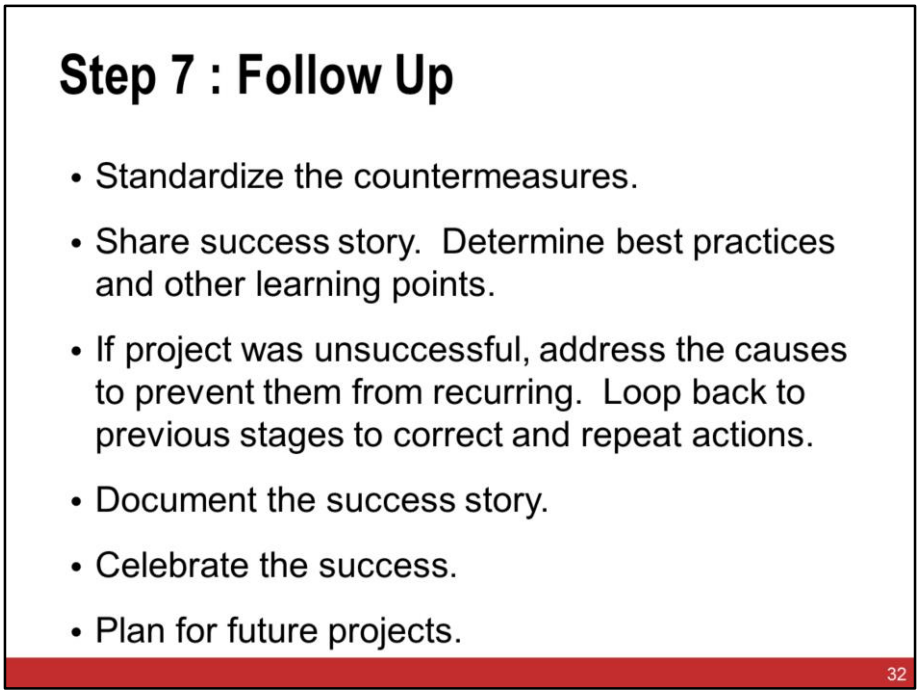
Review: Slide

Activity: Select work related problem, complete step 5



Review: Slide

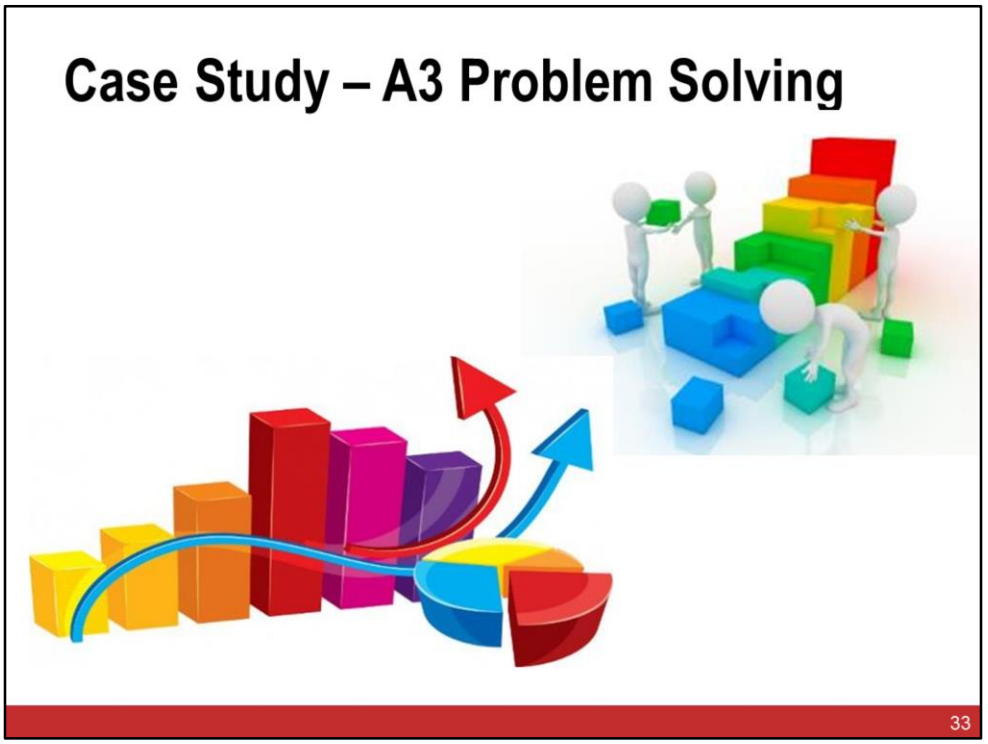
Activity: Select work related problem, complete step 6



Review: Slide

Activity: Select work related problem, complete step 7

Activity: Albatross



Activity: Sash Bonding

Review: Next steps

Activity: Complete course evaluations

Problem Solving for Production

Course Description

Using A3 Problem Solving techniques, this is an activity-based, 8-hour course intended to showcase the power and utility of this process improvement system.

Participants will learn and apply a consistent and comprehensive process using a variety of activities, case studies and work-related problems.

1

Course Objectives

As a result of this course participants should be able to:

- Explain why continuous improvement is needed and why it is easier said than done
- List advantages of A3 Problem Solving and describe how it is used to eliminate waste and reduce variation
- Distinguish between value added and non-value added activities
- Apply A3 thinking along with basic quality tools (cause & effect, multi-voting, process flow, pictograph, Pareto, run chart, 5-why, scatter diagram, histogram, etc.) to solve problems

2

What is a Problem?

A problem is:

- An event where requirements (external or internal customer) are not being met.
- An unforeseen occurrence or event.

3

What is Problem Solving?

- Elimination of the cause of a nonconformity, potential nonconformity or other undesirable condition in order to prevent its occurrence or recurrence.

4

What is an A3?

- An A3 is a **one-page story** about the logical thinking process to "grasp the situation".
- Helps everyone within the organization see the process clearer, leading to more effective improvement.
- Types of A3:
  - Problem solving ← Focus of this presentation
  - Proposal
  - Status
- Based on the Plan, Do, Check, Act (PDCA)

5

A3 Problem Solving

When to use A3

- Anytime you desire to clearly tell a story – especially when you wish to simplify or clarify a complicated story

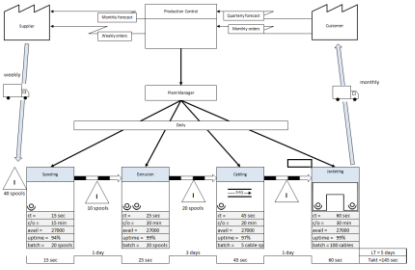
Why use A3

- Improves logical thinking and decision making
- Promotes consistency for better communication
- Alleviates overburden, eliminates waste and reduces variation

6

Reasons for A3 Problem Solving

- Allows your story flow in a logical sequence by including only points needed to tell the story.
- Uses fewer words and more graphs and visuals to tell your story.



7

Relationship Between A3 & PDCA

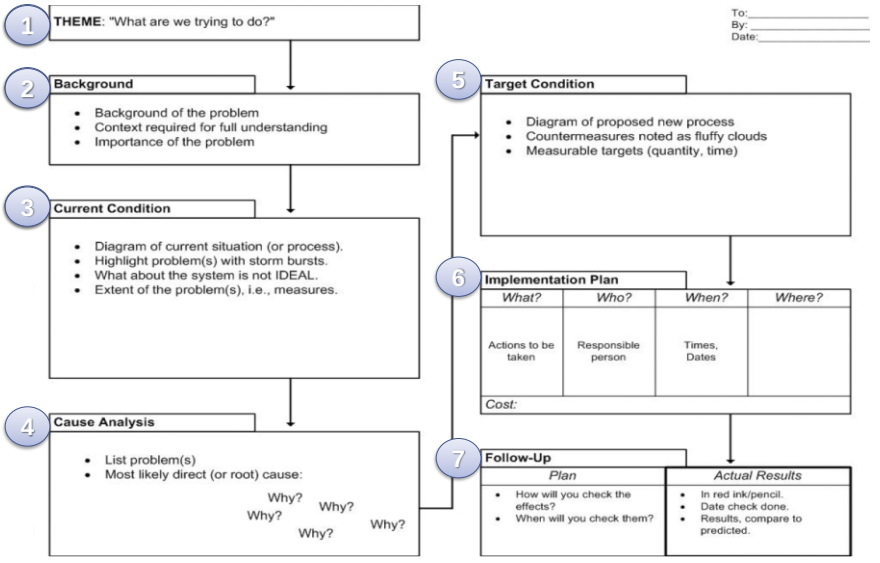
A3 Problem Solving Report

Plan ⟷ Do, Check & Act

Theme	Target Condition
Background	Implementation Plan
Current Condition	Follow up
Cause Analysis	

8

A3 Storyboard Layout



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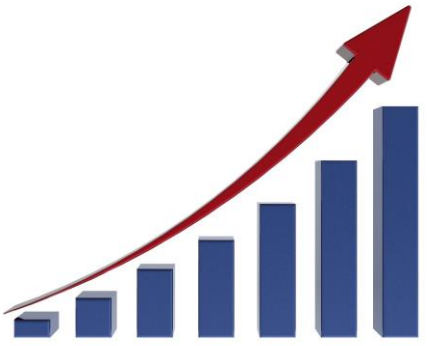
Benefits of A3 Problem Solving

- Increased customer satisfaction
- Increased market share
- Lower costs
- Faster delivery tin
- Increased profitab
- Increased efficien
- Improved morale



10

A3 Problem Solving is a "Team" Activity!

- Team norms
- Team roles (champion, team leader, facilitator, recorder, team member)
- Stages of Team Development (form, storm, norm, perform)

11

The 4 Rules in Use

Rule 1: **<u>Activities</u>** (all activities of work in a process)

- Clearly specified by:
  - Content (what the work is)
  - Sequence (in what order should it occur?)
  - Timing (about how long should it take?)
  - Outcome (what result is clearly expected?)

12

Questions…

- Is it clear what should happen, and what order, and in what approximate time frame?
- Is every step in the process adding value to the customer?
- Is the participation of every person who touches the process necessary?
- Does everyone who uses this process perform it the same way?
- How does a new worker learn this process?
- How did you learn this process?
- Approximately how long should the process take to complete?
- Is the expected outcome clearly understood?

Answers to these kind of questions illuminate strengths and weaknesses of the process and contribute to ideas for redesigning the work.

13

Negative Keywords

- Listen for the negative keywords that quickly become like fingernails on a blackboard-the ones that point clearly to an inconsistent and unreliable process. Here are a few of those words: *sometimes, maybe, if, it depends, possibly, perhaps,* and the classic answer to "*why do we do it this way*?" Which is, of course, "*because we've always done it this* way!"

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The 4 Rules in Use

Rule 2: Connections

- Direct communication between two people… (think of making a request)
  - Direct (no middle man in the request)
  - YES / NO answer (no "maybes")

15

The 4 Rules in Use

Rule 3: Pathways

- Steps in delivering the requested product or service
  - Simple (involving as few steps and people as necessary)
  - Direct

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The 4 Rules in Use

Rule 4: Improvement

- Direct response to a problem
- As close to the problem as possible
- As an experiment
- By those doing the work
- Supported by a coach

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A3 Thinking Throughout the Organization

- Management Challenges
  - Top down decision delegation to coaching and approving
  - Persistent reverence for employees
- Specificity of A3 Problem Solving
  - Address issues quickly
  - Focus on specific, significant problems
- Adapting to Change
  - A3 is really about adapting to change
  - Internal changes, administrative changes, regulatory changes
- Observation
  - The keystone to success
  - Depends on adequate preparation and inclusion of applicable workers

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Step 1: Theme

- Every report begins with a title that introduces the content to the audience.
- The theme should help the audience quickly discern the gist of the content. In essence, **the theme is the report or document description**.
- Examples include:
  - Reducing errors in production
  - Improving employee retention rate
  - Reducing delivery time
  - Improving server uptime

19

Step 2: Background

- Document important background information that is essential for understanding the **extent and importance of the problem**.
- You must be **aware of your audience**, including their background and information needs.
- If the background is not clear, the audience may not understand what the report is about, resulting in wasted time explaining what the presentation or report is trying to accomplish.

20

Step 2: Background - Review Questions

- Is there a clear theme for the report that reflects the content?
- Is the topic relevant to the organization's objectives?
- Is there any other reason for working on this topic (e.g., learning purposes)?

21

Step 3: Current Condition

- This section is perhaps the most important in the A3 report. The objective is to frame the current condition in a **simple way** for the reader or audience to understand.
- In it, the author draws a **visual representation** that depicts the **critical elements** of the system or process that produced the problem.
- This should involve the use of **charts, graphs, tables** or other techniques to depict the current condition while avoiding straight text summaries or bulleted points.

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Step 3: Current Condition

- A good A3 report paints a clear picture of what is going on and does not simply summarize qualitative opinions.
- In this section, the author takes time to investigate the facts of the situation and portray them in a **visual manner** that is helpful to the audience for comprehension.
- The chief goal of the current condition is to provide the audience with a **simple** (but not simplistic!) **overview of the current process** and demonstrate a fact-based understanding of the problem.

23

Goal Statement

- Specify a goal to address the gap or target state from the current state.
- Be ***S.M.A.R.T.*** when setting the goal:
  - **S**pecific
  - **M**easurable
  - **A**chievable
  - **R**ealistic
  - **T**imely

24

Step 4: Root Cause Analysis

- The report author should continue with the investigation of the current condition until the **root cause** of the **problem symptoms** identified in the current condition diagram is uncovered.
- Failing to address the deeply rooted seed of the problem means it will likely recur.
- There are two common methods for root cause analysis:
  - Cause and effect diagram (a.k.a. fishbone diagram)
  - 5 Whys

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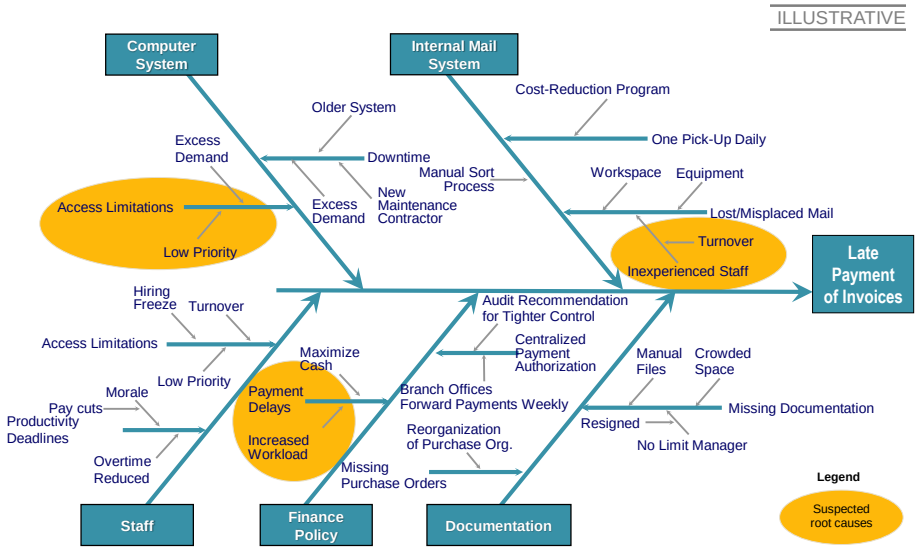
Example: Cause and effect diagram used in solving the problem of "Late Payment of Invoices"



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Example of 5 Whys

ILLUSTRATIVE

	Why?	Answer
1	Why is there oil on the floor?	Oil leaks from the cylinder rod when activated.
2	Why did oil leak?	The O-ring was cut.
3	Why was the O-ring cut?	The rod was flawed.
4	Why was the rod flawed?	Dirt in the oil abrades the rod.
5	Why did dirt get in the oil?	There are holes and gaps on the upper plate of the tank.

Root cause of the problem

27

Step 5: Target Condition

- After root cause analysis, the problem solver should have a deep understanding of how the work currently gets done and a good grasp of the root cause(s) of the problems experienced with the system.
- He/She is now ready to consider how the system might be improved.

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Step 5: Target Condition

- Countermeasures address the root cause(s) while conforming to lean design principles.
- The goal is to move the organization closer to an ideal state of providing exactly what the customer needs, safely, when needed, in precisely the right quantity and without waste.

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Step 6: Implementation Plan

- Make sure to address the potential root cause(s) with action items.
- Identify who will implement the countermeasures.
- Make it clear exactly what will be done.
- Clarify the due date by which action items will be completed.
- Make the implementation order and location clear.

30

Step 7 : Follow Up

- Standardize the countermeasures.
- Share success story. Determine best practices and other learning points.
- If project was unsuccessful, address the causes to prevent them from recurring. Loop back to previous stages to correct and repeat actions.
- Document the success story.
- Celebrate the success.
- Plan for future projects.

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Case Study

32


Thank you
33

Sash Bonding Case Study

Historical Information:
Sash bonding involves the adhesion of materials to the door glass during production. The problem discussed is the bonding pulling away from the glass. The process involved has been a three-shift operation from the start of production.

Process and Materials:
The sash is attached with a “hot melt” adhesive, which is used for this car line only.

There are other adhesives, with higher bond strengths, but these adhesives cost up to three times more. The process engineer has determined that the adhesive currently being used is strong enough for this operation.

The priming operation is exclusive to this model and is an integral part of the bonding operation. To prevent problems, the primer is changed each day at the beginning of the first shift. This process requires two hours to complete.

When bond separation is detected, the part is then sent to the rework station for repair. Rework is performed by first cleaning the glass with a water rinse, then drying. The glass is then primed and adhesive is applied by hand. The rework station uses the same brand of primer and adhesive, as does production.

To help the participants better understand the process, a schematic of the glass priming process is provided along with additional information that could also cause a nonconforming bond.

1. If the rollers of the priming operation are not evenly spaced, there is not a strong bond to the glass. In the past, this caused problems in climates that are excessively cold or hot.
2. If the roller is lopsided or does not roll freely, there is a particular area of glass that tends to consistently separate.
3. The adhesive is not meeting the specifications for bond strength
4. A poor quality primer, or primer not being properly applied
5. Adhesive not being given the proper amount to cure

Glass Priming Process:

The first step in this process is to enter with the glass and then smooth any rough edges. After taking care of the rough edges, rinse the glass clean with water. Next check the glass to see if it is smooth and clear. If the glass is not smooth, then it goes back to the smoothing process and is then cleaned again. Once the glass is clean and smooth, it then proceeds to the primer tank. Before proceeding with the primer operation the operator must check the level of primer in the tank. If the primer is low, the operator must fill the tank to its proper level. The operator then places the glass between the rollers to apply the primer. The roller operation begins applying the primer, which takes approximately 15 seconds to complete. Next, the glass is removed from the tank. If the rollers do not function properly, the operation is stopped, and a call is made to the repairman for assistance. Once the glass is removed it is allowed to cure for 15 minutes; at this point, the priming process is completed and the glass is transported to the next station.

Potential Causes:

After a brainstorming session, the team has developed a list of some potential causes to this problem. They are as follows:

Training	Primer tank	Roller diameter
Application	Primer	Primer contamination
Operator skills	Glass doors	Smoothness of glass
Time of day	Primer age	Dilution of primer
Curing time	Primer level	Roller free rolling
Knowledge	Roller Spacing	Application of primer
Glass surface	Measuring skills	Primer of glass
Primer to sash	Quality of primer	Vendor of primer

Sash Bonding Data:

The following data is collected about the pull strength of the bond. Column 1 lists the observed pull strength. Column 2 displays the various simulated temperatures at the observed strength.

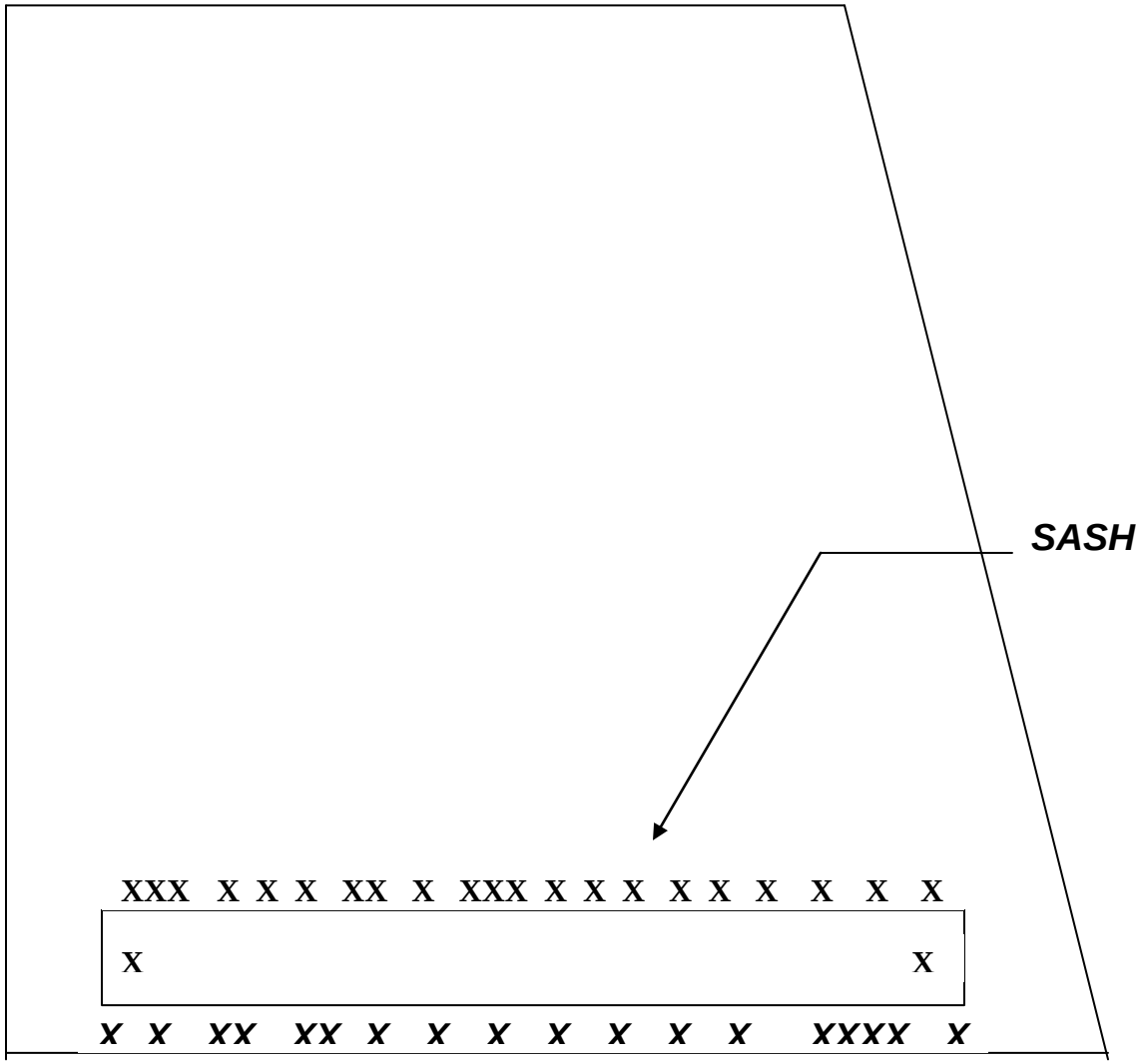
Temperature is in Fahrenheit.

Pull Strength	**Temperature**
600 lbs.	120^0 , 40^0
550 lbs.	100^0, 80^0, -20^0
500 lbs.	110^0, 100^0, 80^0, 40^0
450 lbs.	70^0, 60^0, 20^0, 0^0
400 lbs.	120^0, 90^0, 70^0, 0^0
350 lbs.	110^0, 80^0
300 lbs.	80^0, 70^0, 60^0
250 lbs.	70^0, 60^0, 50^0, 40^0, 30^0, -10^0
200 lbs.	110^0, 90^0, 40^0, 30^0, 10^0, 0^0
150 lbs.	100^0, 70^0, 20^0, -30^0
100 lbs.	80^0, 40^0
50 lbs.	70^0

Pull strength audited a total of 3,000 doors. These consisted of 1,500 doors from production along with 1,500 doors from the rework station. The specification for pull strength is 250 lbs. The results are as follows:

Pull Strength (lbs.)	**Production**	**Rework**
50-149	50	0
150-249	100	0
250-349	130	70
350-449	220	230
450-549	290	470
550-649	270	490
650-749	210	190
750-849	120	50
850-949	70	0
950-1049	40	0

Pictograph
The example shown below is a drawing is a pictograph of the sash. The **X** indicates the location where the bond begins to separate.



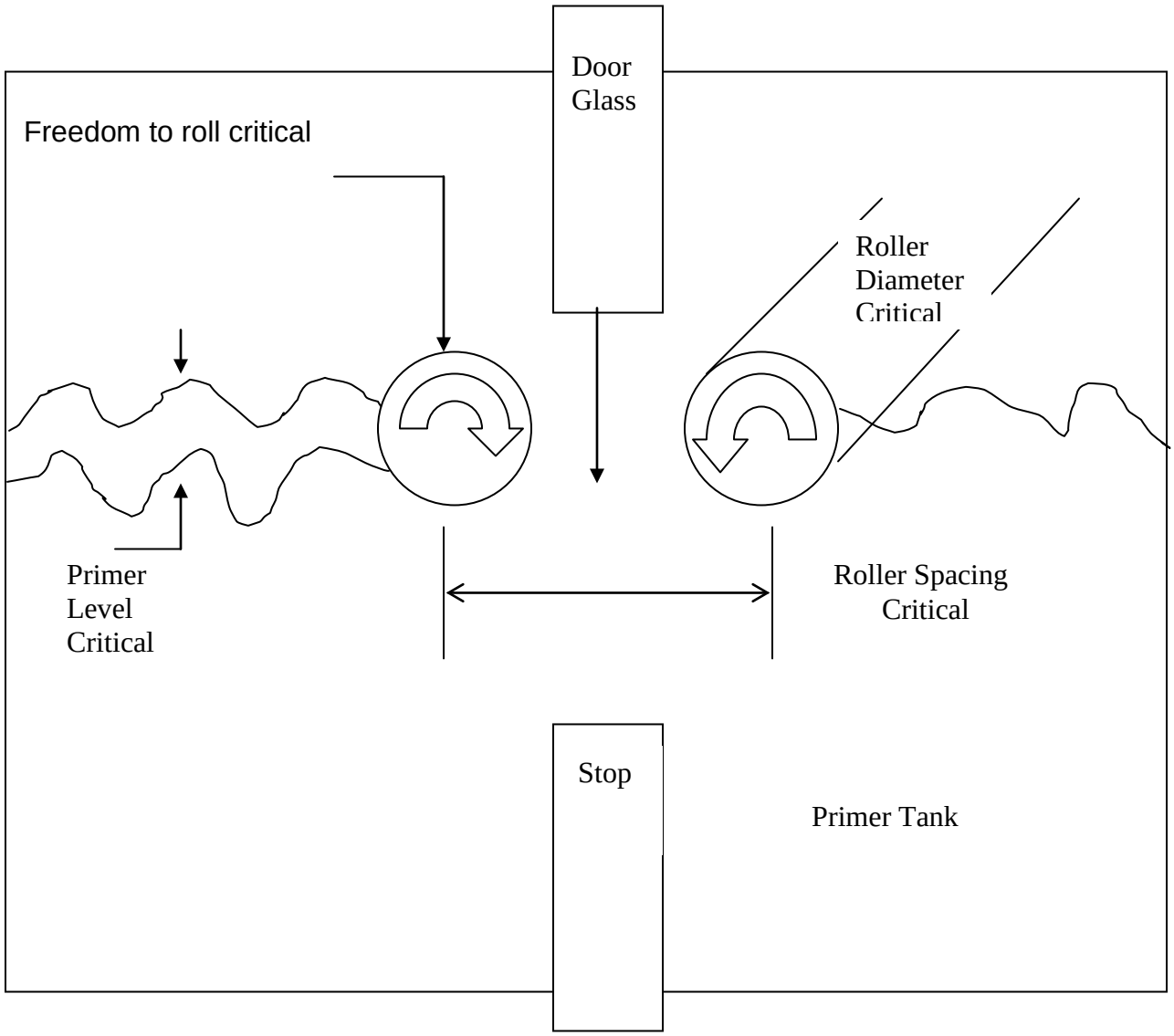
Sash Bonding Data:

Pull strength versus the age of the primer lists the following data:

Pull Strength	**Number of Hours Old**
700	1, 1, 2
650	1, 2, 3
600	1, 3, 4
550	3, 4, 4, 5
500	5, 6, 6, 7
450	5, 6, 7
400	6, 7, 7, 8
350	5, 8, 8, 8
300	6, 8, 8, 10
250	7, 7, 8, 9
200	8, 8, 9
150	9, 10, 11
100	10, 11, 11

Glass Priming Operation Schematic:

Below is a schematic of the glass priming operation. This is the only drawing available at this time. It is included to provide some idea of what is involved with the process.



THE ALBATROSS

A certain West Coast University scientist chartered a ship for exploration purposes. When a large white bird was sighted the scientist asked permission to kill it. He stated that white albatrosses are usually found only off the coast of Australia. He wanted the bird as a specimen for the University Museum.
The crew protested against the killing of the bird, calling the scientist's attention to the old sea superstition that bad luck followed the killing of a white albatross.

Nevertheless, the captain granted permission to kill the bird and the bird was killed. These mishaps happened after the bird was killed.

- The net cables fouled up three times.
- The net was caught on the bottom and ripped to shreds.
- The shaft on the main winch snapped and it took the crew members five hours to reel in by hand 1700 feet of cable.
- A rib was broken when Jackie Larson, a scientific aide, fell down a hatch ladder.
- The scientist became seasick for the first time in his life.
- Lost gear forced the ship to head for land.
- The cook left his job.

Statements about the Story

1. The scientist had never been seasick before.	T	F	?
2. After the scientist shot the albatross the trouble happened.	T	F	?
3. The scientist was not from a University or College.	T	F	?
4. The scientist asked the captain for permission to kill the bird.	T	F	?
5. The ship was chartered by a scientist.	T	F	?
6. The net was ripped on the bottom of the sea.	T	F	?
7. The white albatross was sighted near Australia.	T	F	?
8. When an albatross was sighted flying near the ship, the scientist asked permission to kill it.	T	F	?
9. The net was not damaged.	T	F	?
10. The trouble happened after the albatross was killed.	T	F	?
11. The ship, propelled by a motor, was in difficulty after the gear broke.	T	F	?
12. Permission to kill the bird was given by the captain.	T	F	?
13. The sailors were not disturbed when the scientist violated the old sea superstition.	T	F	?
14. The person who fell down a hatch ladder was a man named Larson.	T	F	?
15. The scientist did not ask the crew for permission to kill the albatross.	T	F	?
16. The scientist's attention was called to the old sea superstition that bad luck follows the killing of a white albatross.	T	F	?
17. The naturalist did not ask permission to kill the bird in order to secure it as a museum specimen.	T	F	?
18. Lost gear was not the reason the ship landed.	T	F	?
19. The crew protested against the killing of the bird.	T	F	?
20. The scientist's aide was Jackie Larson.	T	F	?

Subject Matter Expert (SME) Course Review Summary
College: Lansing Community College
M-CAM Training Area: ☐CNC/Machining ☐Multi-Skilled/Mechatronics ☒Production Operation ☐Welding/Fabrication
Degree Program Name:
Title of Course: A3 Problem Solving
Subject Matter Expert (SME) Reviewer Information **Name: Fredric Ford** **Title: GM Retired maintenance Supervisor/Journeyman, Electrician** **Phone: (517) 488-7341** **Email: coachford@sbcglobal.net** **Organization/Affiliation: GM Retired**
Attach Resume or provide credentials (showing years of experience and work experience that is relevant to course content):
Synopsis of Findings: **After reviewing the course, this course would prepare a participant for working on a team and solving problems in the production environment. This would be a great training class for participants in local manufacturing companies.**

Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review

1. Course Overview and Objectives	Exceptional	Satisfactory	Ineffective
The goals and purpose of the course is clearly stated.	X		
Prerequisites and/or any required competencies are clearly stated.		X	
Learning objectives are specific and well-defined.	X		
Learning objectives describe outcomes that are measurable.	X		
Outcomes align to occupational focus (industry skills and standards).	X		
Comments or recommendations:			

2. Material and Resources	Exceptional	Satisfactory	Ineffective
The instructional materials contribute to the achievement of the course learning objectives.	X		
The materials and resources meet/reflect current industry practices and standards.	X		
The instructional materials provide options for a variety of learning styles.	X		
Resources and materials are cited appropriately. If applicable, license information is provided.		X	
Comments or recommendations:			

3. Learning Activities	Exceptional	Satisfactory	Ineffective
Provide opportunities for interaction and active learning.	X		
Help understand fundamental concepts, and build skills useful outside of the learning object.	X		
Activities are linked to current industry practices and standards.	X		
Comments or recommendations:			

Michigan Coalition for Advanced Manufacturing
Subject Matter Expert Course Review

4. Assessment Tools/Criteria for Evaluation	Exceptional	Satisfactory	Ineffective
The course evaluation criteria/course grading policy is stated clearly on syllabus.	**X**		
Measure stated learning objectives and link to industry standards.	X		
Align with course activities and resources.	X		
Include specific criteria for evaluation of student work and participation.	X		
Comments and recommendations:			

5. Equipment/Technology	Exceptional	Satisfactory	Ineffective
Meets industry standards and needs.	**X**		
Supports the course learning objectives.	X		
Provides students with easy access to the technologies required in the course/module.	X		
Comments and recommendations:			

This workforce solution was funded by a grant awarded by the U.S. Department of Labor's Employment and Training Administration. The solution was created by the grantee and does not necessarily reflect the official position of the U.S. Department of Labor. The Department of Labor makes no guarantees, warrantees, or assurances of any kind, express or implied, with respect to such information, including any information on linked sites and including, but not limited to, accuracy of the information or its completeness, timeliness, usefulness, adequacy, continued availability, or ownership.

Michigan Coalition for Advanced Manufacturing

Reviewers Signature Freedric Ford Date: 3/3/17

FREDRIC H FORD

6455 Pleasant River Dr., Dimondale, Michigan 48821 ◆ H: 517-488-7341 ◆ coachford@sbcglobal.net

PROFESSIONAL SUMMARY

A manufacturing professional with an extensive, broad-base background of diversified responsibilities and accomplishments in automotive industries. Well established knowledge in business operation areas including information systems, facilities management, production operations and public relations. Excellent team builder with strong employee development skills. Reputation of getting tasks completed with high quality results.

SKILLS

- Strong collaborator
- Technological instruction
- Positive learning environment
- Creative questioning
- Critical thinking
- Student motivation
- Interpersonal skills
- Outstanding social skills
- Positive reinforcement
- Effective time management
- Creative learning strategies
- Classroom discipline

INTERESTS

License, Master Electrician, State of Michigan License, Electrical Contractor, State of Michigan MEMBERSHIPS / AFFILIATIONS / AWARDS Holt/South Lansing Rotary (Past President Elect) Holt Board of Education, Treasure, (Past), Friendship House of Prayer Baptist Church, Deacon

WORK HISTORY

Career Liaison Region 7, 10/2013 to 11/2015
Lansing Community College

- Career Liaison Region 7 Support ways to connect employers, educators and students together.
- I utilize industry data from both state and local resources, collaborating with nonprofit, Michigan Works.
- The Career Liaison is to better inform the students\' Parents / Guardians and Educators about jobs and training.
- The liaison role is to increase enrollment in high demand training programs and reduce the skills gap in Michigan.
- Prior Learning Assessment (PLA Coach) Define the Prior Learning Assessment process and how it works.
- Identify educational goals for the assessment of credit.
- Explore methods to organize your learning.
- Develop a learning portfolio.
- Compile supporting documents.
- Developed program to work with students and increase interest in higher learning.
- Consistently received positive teacher evaluations from students.

01/2004 to 01/2009
GENERAL MOTORS – Lansing, Michigan

Material Shift Leader, 01/2004 to 01/2009
Lansing Delta Township

- Manufacturing professional with extensive years of experience ranging from basic engineering, material short lead time, and total program management at the department head level.
- Managed a material staff with over three hundred hourly and 32 salaried employees. Responsible for supply chain management of four (4) manufacturing facilities.
- Commodities included steel, steel stamping, mechanical assemblies, capital equipment and vehicle parts from beginning of build to end of build and shipping.

- Interviewed and successfully hired over 300 salary personnel for the launch team for start up of new plants.
- Averaged 25% cost reduction over a five year period, primarily through efficiency gains.
- Reduced lead time by implementing in house sequencing cost savings of $2.3 million.
- Saved $1.8 million in one year by converting nine receiving docks to dolly prep.
- Area of safety credited for no lost work days in five years.

Superintendent Manufacturing Engineering, 01/2002 to 01/2004

- Responsible for manufacturing equipment and the reliability and quality of all parts.
- Reduced plant downtime by developing a manual back up plan through the continuous improvement process.

Production Superintendent of Body, 01/1997 to 01/2002

- Set and monitored budget and business plan goals.
- Supported Global Manufacturing System principles by increasing diversity awareness within the shop.
- Reduced structural cost; reinforced core values, customer enthusiasm, continuous improvement, and efficiency gains.
- Received accolades and recognition for superior management skills in leading productivity and quality, averaging over 60 jobs built per hour in each department which also set quality standards for others.

Maintenance Coordinator, 01/1993 to 01/1997
Lansing Car Assembly

- Supervised maintenance and environmental salaried employees.
- Reviewed breakdowns and engaged in problem solving and decision making.
- Interviewed prospective supervisors and evaluated current supervisor productivity, absenteeism budget monitoring and cost control.
- In plant facilitator Quality Network Maintenance and Production Maintenance Partnership.

Lansing Car Assembly Maintenance Supervisor, 01/1980 to 01/1992

- Scheduled mechanical and electrical repairs, installations and directed.
- Millwrights, pipefitters and electricians.
- Elected by my superiors to change the culture of the maintenance department from working out central maintenance to area maintenance.

EDUCATION

BA:
Northwood University - Midland, Michigan

AS:
Lansing Community College - Lansing, Michigan

Journeymen Electrician: Electrical Apprenticeship, 1977
I.B.E.W. Lansing Community College -
Electrical Apprenticeship

ADDITIONAL INFORMATION

- License, Master Electrician, State of Michigan License, Electrical Contractor, State of Michigan MEMBERSHIPS / AFFILIATIONS / AWARDS Holt/South Lansing Rotary (Past President Elect) Holt Board of Education, Treasure, (Past) Friendship House of Prayer Baptist Church, Deacon Phi Beta Sigma Fraternity, Inc., Epsilon Tau Sigma Chapter, Lansing, Michigan GM President Award, Holt Sports Hall of Fame Competitive Manufacturing 2000 Effective Small Team Implementation Award