How to Solve a Problem with an A3 & Root Cause Analysis

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SURFING THE WAVE OF LEAN DESIGN AND CONSTRUCTION

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Integration Point LLC

Problem Statement

In the fast-paced construction environment, the pressure to deliver often pushes teams to focus on immediate fixes rather than addressing the root causes of recurring issues, hindering long-term productivity.

This presentation will address how the A3 problem-solving process, systems thinking and root cause analysis can be integrated to identify and eliminate these underlying problems.

By applying a structured problem-solving process and addressing the real root causes of issues, we can enhance overall project delivery and outcomes.

Session Objectives

01.
Clarify the difference between linear thinking and systems thinking and their effects on organizational problem solving.

02.
Teach the A3 Problem Solving & Root Cause Analysis tools to establish a common framework for problem solving and continuous improvement.

03.
Enhance our understanding by providing real live organizational and project examples of the A3 and root cause analysis processes in use.

Principle #1 – Got no problems?

"Having no problems is the
biggest problem of all."
Taichi Ohno

What is the goal?

- To better understand the system in which we work in and influence. The more we understand the system to more we can begin to make appropriate changes.

- Thinking in systems, along with self awareness, allows for us to see things that we may not otherwise see.
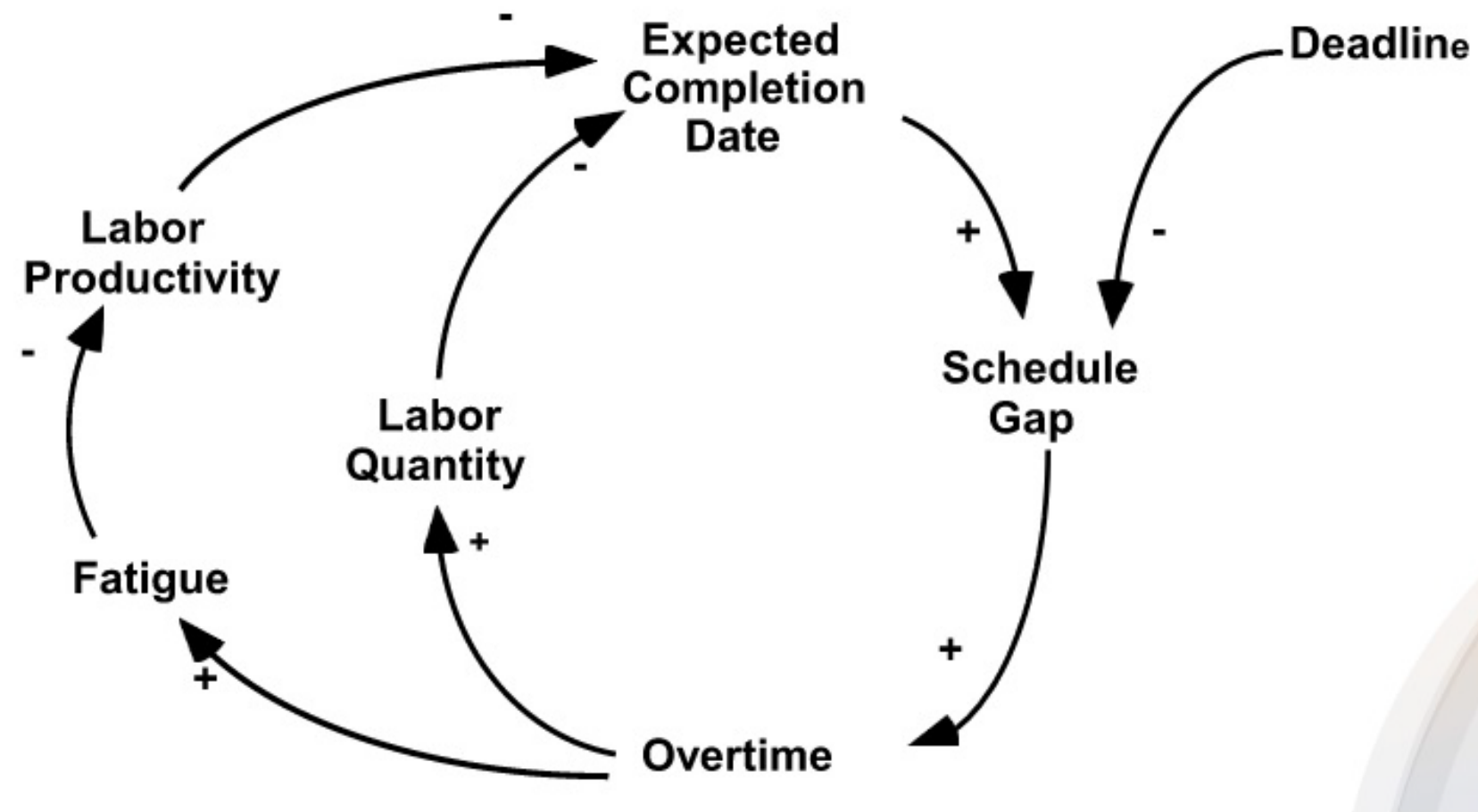
Traditional Thinking vs Systems Thinking

- Think about a time on a project where you kept doing something but it didn't really have the effect you hoped it would

- Linear thinking assumes everything is equally proportional

LINEAR THINKING

SYSTEMS THINKING
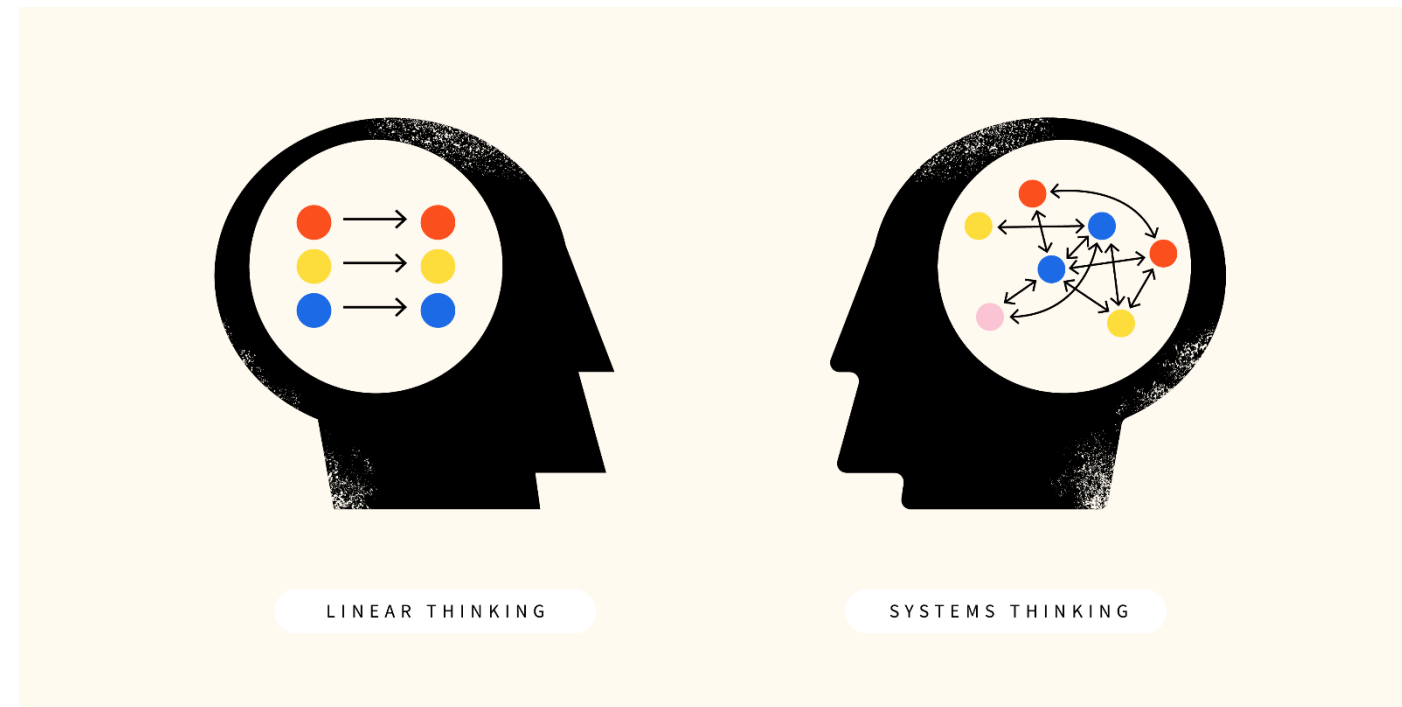
Jobsite Example of Feedback Loop – OT

- Unintended consequences of OT

Jobsite Example of Feedback Loop – Submittals

- Multiple submittals are sent in for approval, many of them well ahead of the needed date for approval

- This takes up a lot of capacity for reviewer

- The project team needs a quick review on a submittal that is urgent but the reviewer is still at capacity with submittals

- The unintended consequence – priority submittals get lost in the shuffle

Jobsite Example of Feedback Loop – INJURY
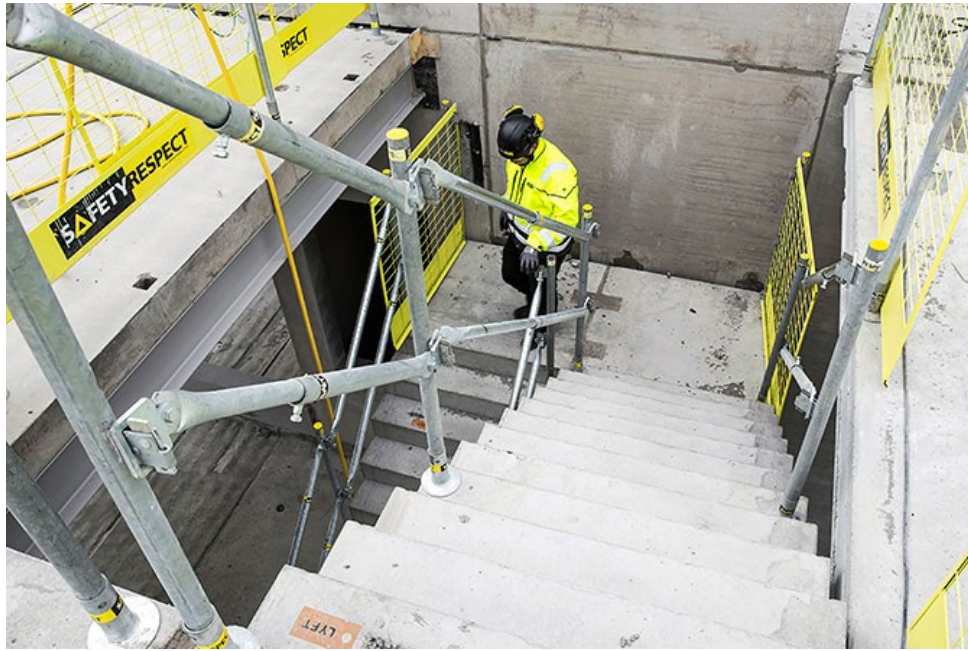
- Trade contractor carrying material up the stairs had minor injury with a sprained ankle

- We all looked at why he wasn't holding the rails, why he didn't have someone helping him, etc

- The only reason he had to carry material was because he couldn't get a ride on the buck hoist

- The ROOT CAUSE – GETTING A RIDE ON THE BUCK HOIST WASN'T PROPERLY SCHEDULED/COORDINATED

Asynchronous

The outcome of actions many times do not occur in time and space proximity

Typical Problem-Solving Process

Problem-Solving Kit

1. Place on firm surface.
2. Follow directions provided in circle.
3. Repeat until problem goes away or is replaced with new one, then go back to beginning.

BANG HEAD HERE

- Quick fix solutions are often aimed at surface symptoms rather than root causes
- More blame finding than problem solving
- Opinions & anecdotal evidence suffice in place of hard facts 'from the gemba'
- Lack of time prevents adequate inquiry into the true nature of the problem
- The need to address issues 'immediately' supersedes the need to address 'permanently'
- Does not address the system that allowed the problem to occur in the first place

A3 Thinking for Problem Solving

A3 Thinking is a collaborative tool that supports sound decision making by:

- Providing a <u>visual manifestation</u> of the <u>thought process</u> of the <u>team</u> at arriving at a decision.

- Organizing the thinking methodology on an 11x17 piece of paper.

- Leading to <u>alignment</u> or consensus.

- Following PDCA

Why teams/organizations use A3s?

- *The ultimate goal is not just to solve the problem at hand – but to make the process of problem-solving transparent and teachable in order to create an organization populated with problem solvers.*
  - Started as a way for teams to show project stakeholders decisions and processes to ultimately gain approval and document critical decisions
  - We create an A3 as a purpose for solving a problem if there is a standard, plan, or goal we are not currently meeting.
  - We create an A3 for documenting and distributing improvement opportunities to project teams, companies, and industries.
  - We create an A3 to show results of our projects, metrics, and other information relative to performance.

When should I use an A3?

- In the middle of a problem right now…

- Making a decision…

- Retrospective – lessons learned analysis…

A3 #	A3 Title	Rev #	Rev Date	Champion	Collaborators	A3 Sponsor	Status

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Background
Why are you talking about it?

•*What is the problem? Can you clearly and succinctly define the "presenting problem" – the actual business issue that is being felt?*
•*What is the business context? How did you decide to tackle this problem?*
•*Who is responsible for the issue? Who owns the process for addressing the problem (or realizing the opportunity or managing the project)?*

Current Condition
Where do things stand today?

•*What do you actually know and how do you know it?*
•*Have you gathered and verified facts – not just data and anecdotes – to clearly understand the current state?*
•*Have you engaged other people?*
•*Have you gone to the gemba, observe, and talk to the people who do the work to fully grasp the current situation?*

Goal
What specific outcomes are required?

•*Can you show the gap between the target and the current condition?*
•*Have you clarified the true business objectives?*

Root Cause Analysis
What is/are the root cause(s) of the problem?

• *Have you used the "5 Whys"? "Five 'Whys' equal one 'How'" – Taichi Ohno*
• *Did you uncover the right (i.e. most meaningful) information to support the analysis?*
• *Did you isolate the root cause(s) of the main components of the gap?*
• *Did you capture this material in the most clear and concise manner, i.e., one that clarifies true problems, invites analytic questions, and suggests direct countermeasures?*

Countermeasures
What is your proposal to reach the future state, the target condition?
How will your recommended countermeasures affect the root cause to achieve the target?

•*Have you explored every reasonable alternative countermeasure?*
•*Have you produced viable alternatives based on productive conversations with everyone doing the work? With the customers of the process? With Stakeholders?*
•*Can you show how your proposed actions will address the root causes of the performance problems?*
•*Can you justify why your proposed actions are necessary?*
•*Have you continued to go to the gemba in gathering new information and countermeasures?*

Plan
What activities will be required for implementation and who will be responsible for what and when?
What are the indicators of performance or progress?

What	By Whom	By When	Where

Costs:

Follow-up Actions
What issues can be anticipated? How and when will you check on effectiveness of your proposed countermeasures?

Plan	Actual Results
•*How will you check the actual effects?* •*When will you check them?*	•*Results as compared to predicted?* •*Date check was done?*

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Why are you talking about it?

- Issues of engineer/planner downtime as a result of computer crashing have been increasing resulting in reduced productivity and lost work.
- Recent project profit variances tied in part to issues associated with planning, though not all hardware related, have triggered research into root causes and their proposed countermeasures.
- Increased pressure in planning phase leads to less review time, which leads to poorer quality.
- Company efforts towards increased prefabrication rely upon accurate planning, without which efficiencies sought through prefab are lost to rework.

Current Condition
Where do things stand today?

- Each crash costs an individual planner approximately 20 minutes of downtime between reboot, returning to where they left off and redrawing if any work was lost.
- Roxanne Mellen of Boston has been keeping tracking of the # of crashes experienced on a daily basis since 6/1/09, the average number of daily crashes through 3/8/10 was (4).
- Other offices experience similar crash experiences, though the frequency is dependent on specific hardware/software conditions (see Root Cause analysis below)
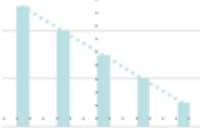
Average of 4 crashes per day = approximately $80/day in lost productivity

36 (32 bit) planning machines could be replaced at a rate of one per day based on lost productivity across the whole group

Goal
What specific outcomes are required?

- Reduce # of average crashes per day to < 1
- Size planning machines to allow for capacity accommodate increased model growth, 2 – 3 years out
- Zero planning defects as a result of downtime

Root Cause Analysis
What is/are the root cause(s) of the problem?

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Countermeasures
What is your proposal to reach the future state, the target condition? How will your recommended countermeasures affect the root cause to achieve the target?

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2. Tips & Tricks training – there are certain tips currently circulating on how to keep systems up and running during CAD operations, *i.e. always close drawing1 file automatically created by AutoCAD each time it opened.* Use the bi-weekly BIM Forum calls to review best practices and capture ideas on BIM Forum Google site.
3. Review virus scanning schedule on individual planner machines make sure none are scheduled to run during the middle of the work day.
4. Formalize tracking mechanism within BIM Forum Google site for capture of planner system crash experience data.

Note: Current CAD machines can potentially be passed on to individuals within the organization needing less computing power, the machines are still high end for those purposes

Plan
What activities will be required for implementation and who will be responsible for what and when? What are the indicators of performance or progress?

Item	Who	When
Review A3 with EMT, Branch Managers and Branch Financial Managers.	KL	5/17/10
Develop schedule for individual machine replacement based on branch, IT and CAD administration workloads.	JJ/CJ and Planning Mgr.	By 6/1/10
Develop BIM Forum Site area for tips and tricks, share current best practices on next BIM Forum call.	KL	By 6/1/10
Review and formalize virus scan process for individual planner machines.	JJ	By 9/1/10

Note: Indicator of performance will be planner system crash experience through and post transition.

Follow-up Actions
What issues can be anticipated?

1. Timing of hardware upgrades with database upgrades and TSI-EST implementation, we will need to address in staggered plan to implement upgrades.
2. Monthly review of individual planner system crash statistics to understand trends.
3. Continued system maintenance best practice sharing in bi-weekly BIM Forum calls.

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A3 Title

Title: Describe problem

Collaborators: Anyone with a stakeholder interest in the outcome

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A3 Background

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Condition — *Where do things stand today?*

•What do you actually know and how do you know it?
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Countermeasures — *What is your proposal to reach the future state, the target condition? How will your recommended countermeasures affect the root cause to achieve the target?*

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Background:
Establish business context & importance

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Note: Indicator of performance will be plannersystem crash experience through and post transition.

Follow-up Actions — *What issues can be anticipated?*

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A3 Problem Statement/Current Condition

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Current Condition   *Where do things stand today?*

- What do you *actually know* and how do you know it?
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- Have you engaged other people?
- Have you gone to the *gemba*, observe, and talk to the people who do the work to fully grasp the current situation?

Problem Statement/Current Condition: Describe what is currently known

What specific outcomes are required?

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...clarified the true business objectives?

What is/are the root cause(s) of the problem?

...used the "5 Whys"? "Five 'Whys' equal one 'How'" – Taichi Ohno
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Plan   *What activities will be required for implementation and who will be responsible for what and when? What are the indicators of performance or progress?*

What	By Whom	By When	Where

Costs:

Follow-up Actions   *What issues can be anticipated? How and when will you check on effectiveness of your proposed countermeasures?*

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•Other offices experience similar crash experiences, though the frequency is dependent on specific hardware/software conditions (see Root Cause analysis below)

Average of 4 crashes per day = approximately $80/day in lost productivity

36 (32 bit) planning machines could be replaced at a rate of one per day based on lost productivity across the whole group

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Goal/Target Condition: Identify the desired outcome

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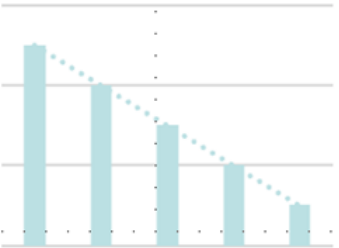| Plan	Actual Results
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- Reduc[...]
- Size pl[...] growth,
- Zero pl[...]

Root Cause

1. Overal[...]
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A3 Analysis

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								CUPERTINO ELECTRIC INC

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• Can you show how your proposed actions will address the root causes of the performance problems?
• Can you justify why your proposed actions are necessary?

Analysis/Think:
Analyze situation & underlying cause creating the gap

Root Cause Analysis — *What is/are the root cause(s) of the problem?*

• Have you used the "5 Whys"? "Five 'Whys' equal one 'How'" – *Taichi Ohno*
• Did you uncover the right (i.e. most meaningful) information to support the analysis?
• Did you isolate the root cause(s) of the main components of the gap?
• Did you capture this material in the most clear and concise manner, i.e., one that clarifies true problems, invites analytic questions, and suggests direct countermeasures?

Goal

• Can you show th
• Have you clarifie

Root Cause Analysi

• Have you used
• Did you uncov
• Did you isolate
• Did you captur
  problems, invit

A3 Analysis

A3 #	A3 Title	Rev #	Champion	Date Started	Collaborators	Approved Date	A3 Sponsor	Status
---	CAD Hardware Crashes	5	Kevin Labrecque	3/12/2010	BIM Planning Managers (Norris, Mellen, Jackson, Johnson, Brown, Kapala, McIntosh, Shepherd)	5/17/10	C. Bacon	Implementation

Background — *Why are you talking about it?*

• Issues of engineer/planner downtime as a result of computer crashing have been increasing resulting in reduced productivity and lost work.
• Recent project profit variances tied in part to issues associated with planning, though not all hardware related, have triggered research into root causes and their proposed countermeasures.
• Increased pressure in planning phase leads to less review time, which leads to poorer quality.
• Company efforts towards increased prefabrication rely upon accurate planning, without which efficiencies sought through prefab are lost to rework.

Countermeasures — *What is your proposal to reach the future state, the target condition? How will your recommended countermeasures affect the root cause to achieve the target?*

1. Hardware Upgrades:
   Option 1: Upgrade all machines to 64 bit machines, (36 out of the 42 planning systems), approximate $3500 for each desktop, total $126,000, or $2400 for each laptop, $86,400. Phased strategy would be recommended based on volume of work within offices and timing of start of new projects. Laptop vs. desktop to be

Analysis/Think: Analyze situation & underlying cause creating the gap

Root Cause Analysis — *What is/are the root cause(s) of the problem?*

1. Overall size of BIM models have been increasing, this trend is expected to continue
2. Multi-tasking, the need to open several drawings & Navisworks to conduct collision detection and work on the model uses a significant amount of Random Access Memory (RAM)
3. Hardware/Software configuration
   • AutoCAD 2010 – Autodesk support for AutoCAD 2008 will be coming to an end forcing the shift to AutoCAD 2010 or 2011, which uses more RAM
   • RAM – as models become larger and software more sophisticated the need for more RAM is increasing, the recommended amount of RAM for CAD systems is a minimum of 8GB.
   • CPU - 32 bit systems maximum RAM capacity is 3.2GB, 64 bit systems can accommodate up to 16 GB.
   • Video Card – recommend 512 MB on laptops and 1GB video cards for desktops
4. Additional background process running, - virus scanning software is typically set to run automatically at noon or overnight for those machines connected to the network. Some planner machines have been found to still be running at noon.
5. Dwg1 file on start-up not visible yet taking up RAM

LIMBACH

The events of a system often occur without seeing the things that caused that event to occur
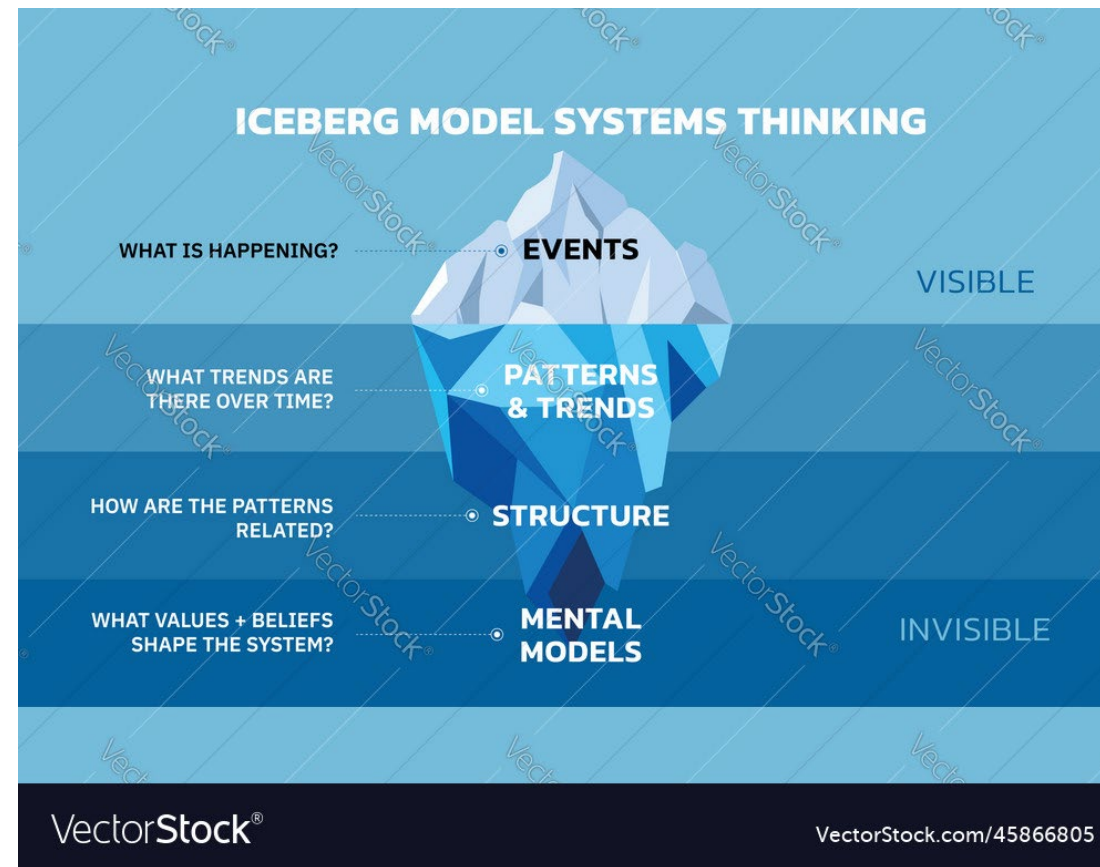
12 Leverage points of a system
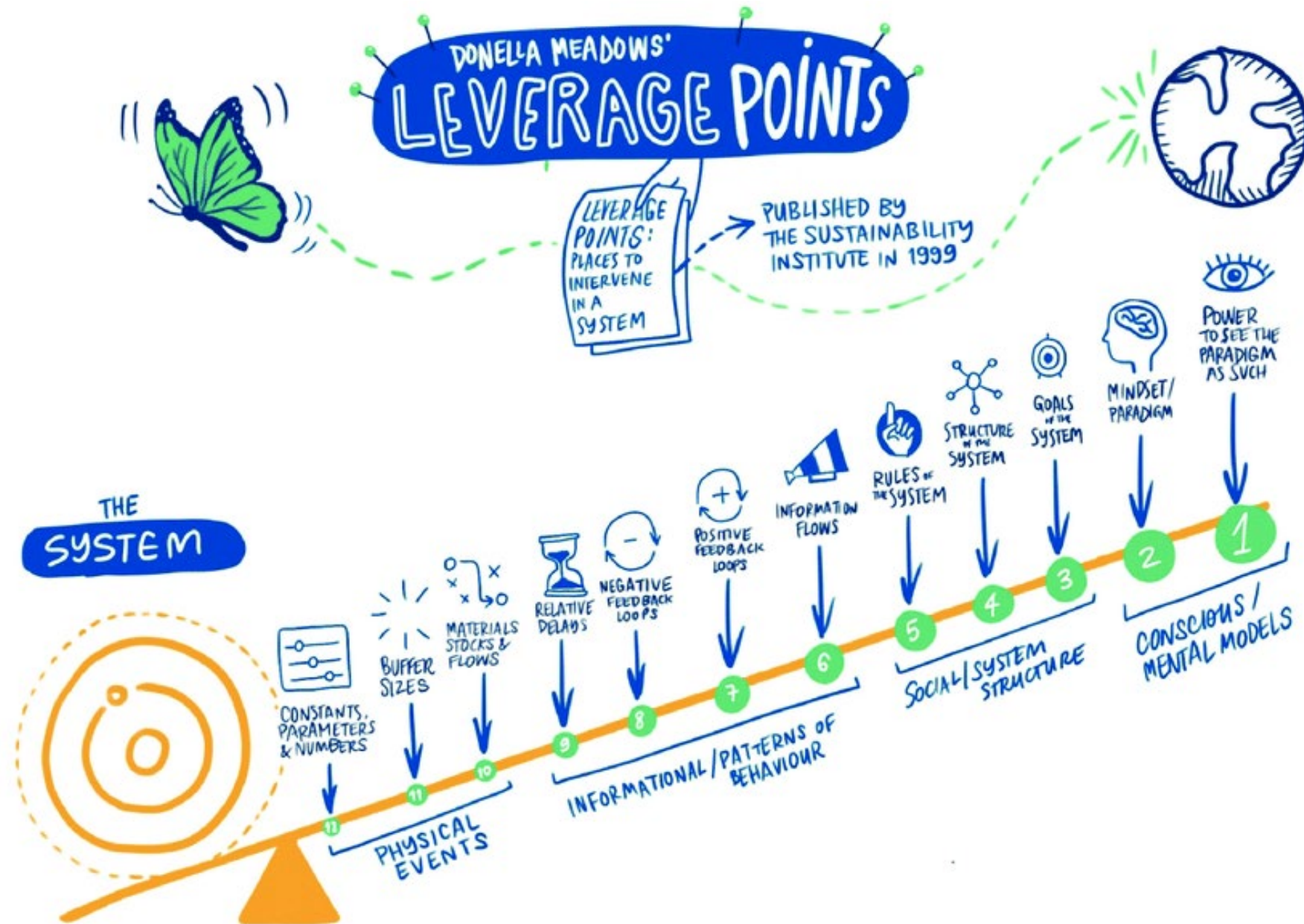
Cognitive Bias

These things can prevent you from seeing how your behavior and decisions effect the system

Fundamental Attribution Error

- The tendency to blame people close to the problem instead of the system that produced the problem

- Blame (fix) processes, not people

PEANUTS: drawings by Charles Schulz; 1989 United Features Syndicate, Inc. Reprinted by permission of UFS, Inc.

"Five why's equals one how."
Taichi Ohno

5 Why's

Problem: The Jefferson Memorial was disintegrating rapidly

Why was it disintegrating? → **Because the cleaning methods were abrasive**

Why?
Why?
Why?

.

Root Cause!

Five Why Analysis helps drive to source of the problem.

The actual technique can take more or fewer iterations.
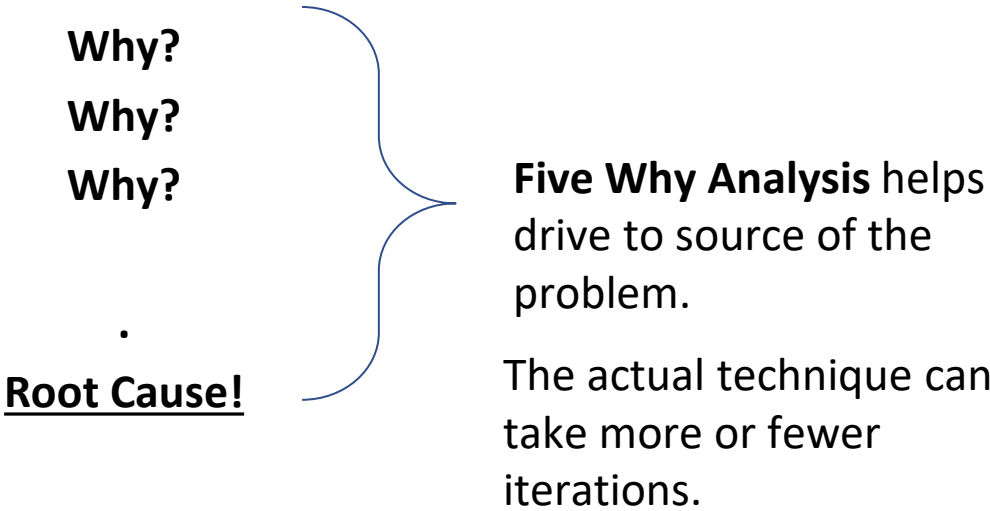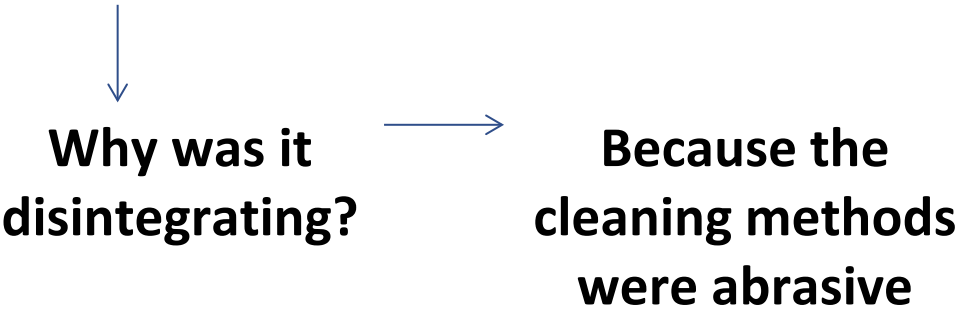
How many whys did it take to get to the root cause of the Jefferson Memorial's problem?

Example Fishbone – Project Profit Variance
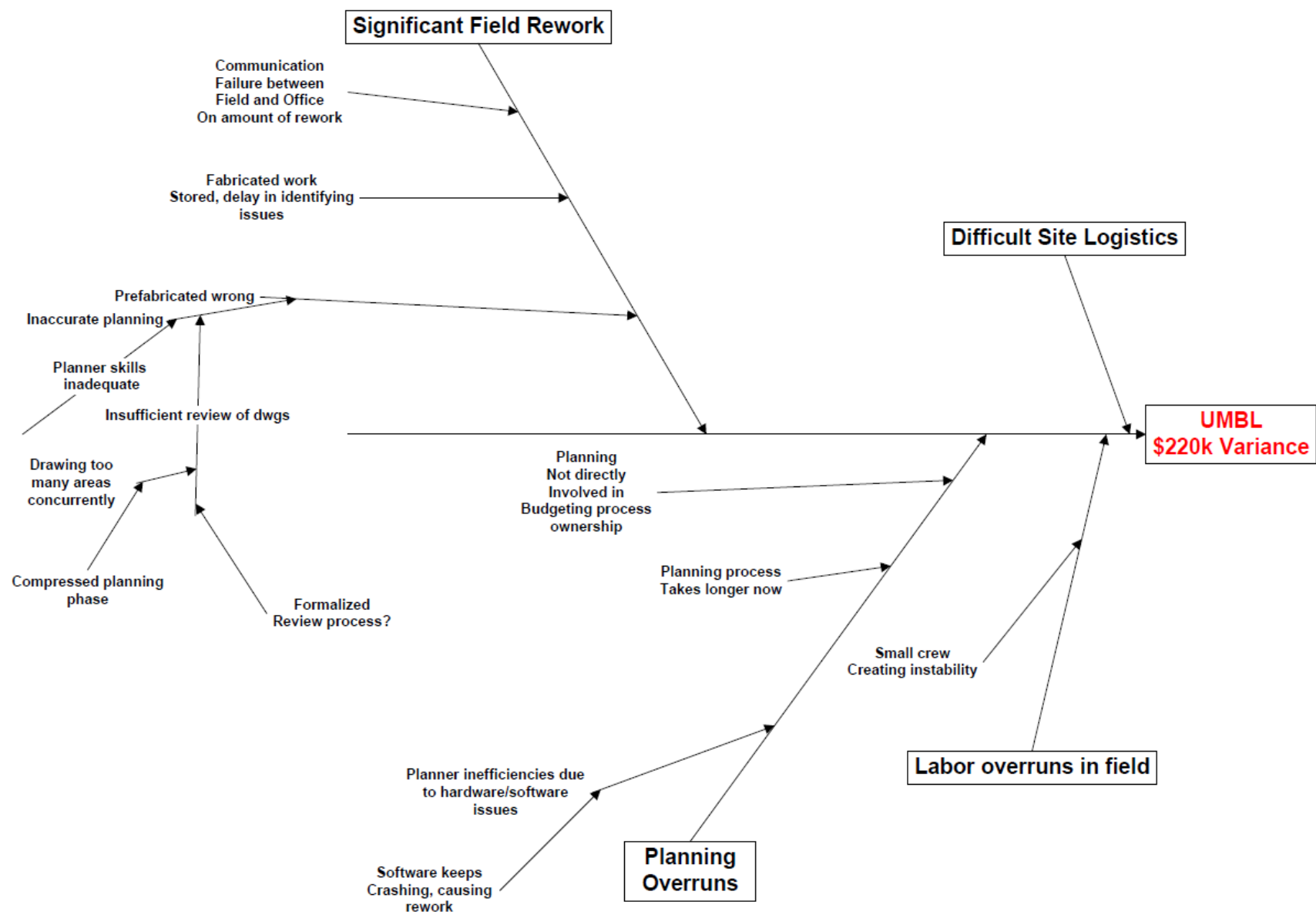
A3 Countermeasures

A3 #	A3 Title	Rev #	Rev Date	Champion	Collaborators	A3 Sponsor	Status

Countermeasures:
Propose countermeasure or action to address the problem

Countermeasures

What is your proposal to reach the future state, the target condition?
How will your recommended countermeasures affect the root cause to achieve the target?

- Have you explored every reasonable alternative countermeasure?
- Have you produced viable alternatives based on productive conversations with everyone doing the work? With the customers of the process? With Stakeholders?

...and succinctly define the "presenting problem" – the actual

...w did you decide to tackle this problem?

...ssue? Who owns ...managing the project)?

Current Condition — *Where do things stan...*

- What do you *actually know* and how do you k
- Have you gathered and verified facts – not ju: current state?
- Have you engaged other people?
- Have you gone to the gemba, observe, and ta current situation?

Countermeasures

What is your proposal to reach the future state, the target condition?
How will your recommended countermeasures affect the root cause to achieve the target?

- Have you explored every reasonable alternative countermeasure?
- Have you produced viable alternatives based on productive conversations with everyone doing the work? With the customers of the process? With Stakeholders?
- Can you show how your proposed actions will address the root causes of the performance problems?
- Can you justify why your proposed actions are necessary?
- Have you continued to go to the gemba in gathering new information and countermeasures?

Goal — *What specific outcom...*

- Can you show the gap between the target an
- Have you clarified the true business objective

Root Cause Analysis — *What is/are the root c...*

- Have you used the "5 Whys"? "Five 'Whys
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- Did you isolate the root cause(s) of the mar
- Did you capture this material in the most cl problems, invites analytic questions, and su

...countermeasures?

	Plan	Actual Results
	•How will you check the actual effects? •When will you check them?	•Results as compared to predicted? •Date check was done?

A3 Countermeasures

Countermeasures: Propose countermeasure or action to address the problem

A3 #	A3 Title	Rev #	Champion	Date Started	Collaborators	Approved Date	A3 Sponsor	Status
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2. Tips & Tricks training – there are certain tips currently circulating on how to keep systems up and running during CAD operations, *i.e. always close drawing1 file automatically created by AutoCAD each time it opened.* Use the bi-weekly BIM Forum calls to review best practices and capture ideas on BIM Forum Google site.
3. Review virus scanning schedule on individual planner machines make sure none are scheduled to run during the middle of the work day.
4. Formalize tracking mechanism within BIM Forum Google site for capture of planner system crash experience data.

Note: Current CAD machines can potentially be passed on to individuals within the organization needing less computing power, the machines are still high end for those purposes

A3 Implementation Plan

A3 #	A3 Title	Rev #	Rev Date	Champion	Collaborators	A3 Sponsor	Status

Implementation Plan: Who, What When of Implementing Countermeasures

Why are you talking about it?

...learly and succinctly define the "presenting problem" – the actual

...did you decide to tackle this problem?

...ho owns the process for addressing the problem (or realizing ...ect)?

Countermeasures — What is your proposal to reach the future state, the target condition? How will your recommended countermeasures affect the root cause to achieve the target?

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...and today?

...know and how do...
•Have you gathered and verified facts – not just d...........lates – to clearly understand the current state?
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Goal

•Can you show the
•Have you clarified

Root Cause Analysis

•   Have you used t...
•   Did you uncover...
•   Did you isolate th...
•   Did you capture...
    problems, invites...

Plan — What activities will be required for implementation and who will be responsible for what and when? What are the indicators of performance or progress?

What	By Whom	By When	Where
Costs:			

A3 Implementation Plan

Implementation Plan: Who, What When of Implementing Countermeasures

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...sure in planning phase leads to less review time, which leads to poorer quality.
...ards increased prefabrication rely upon accurate planning, without which efficiencies sought through

Current Condition — *...s stand today?*

• Each crash costs an individual planner approx... minutes of downtime between reboot, returning to where they left off and redrawing if any work was lost.
• Roxanne Mellen of Boston has been keeping tracking of the # of crashes experienced on a daily basis since

Average of 4 crashes per day = approximately $80/day in lost ...roductivity

36 (32 bit) pl... machines

Countermeasures — *What is your proposal to reach the future state, the target condition? How will your recommended countermeasures affect the root cause to achieve the target?*

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3. Review virus scanning schedule on individual planner machines make sure none are scheduled to run during the middle of the work day.

Plan

What activities will be required for implementation and who will be responsible for what and when?
What are the indicators of performance or progress?

Item	Who	When
Review A3 with EMT, Branch Managers and Branch Financial Managers.	KL	5/17/10
Develop schedule for individual machine replacement based on branch, IT and CAD administration workloads.	JJ/CJ and Planning Mgr.	By 6/1/10
Develop BIM Forum Site area for tips and tricks, share current best practices on next BIM Forum call.	KL	By 6/1/10
Review and formalize virus scan process for individual planner machines.	JJ	By 9/1/10

Note: Indicator of performance will be plannersystem crash experience through and post transition.

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A3 Follow-up

A3 #	A3 Title	Rev #	Rev Date	Champion	Collaborators	A3 Sponsor	Status	

Background — *Why are you talking about it?*

early and succinctly define the "presenting problem" – the actual

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s the process for addressing the problem (or realizing

Follow-up: Creates a follow-up/review process

Current Condition — *things stand today?*

•What do you *actually know* and ho...ow it?
•Have you gathered and verified facts – ...s and anecdotes – to clearly understand the current state?
•Have you engaged other people?
•Have you gone to the gemba, observe, and talk to the pe...do the work to fully grasp the current situation?

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•Can you justify why your proposed actions are necessary?
•Have you continued to go to the gemba in gathering new information and countermeasures?

Goal — *What specific outcomes are required?*

•Can you show the gap...
•Have you clarified th...

Plan — *What activities will be required for implementation and who will be responsible for what and when? What are the indicators of performance or progress?*

Root Cause Analysis

• Have you used the...
• Did you uncover th...
• Did you isolate the...
• Did you capture th... problems, invites a...

Follow-up Actions

What issues can be anticipated? How and when will you check on effectiveness of your proposed countermeasures?

Plan	Actual Results
•How will you check the actual effects? •When will you check them?	•Results as compared to predicted? •Date check was done?

A3 Follow-up

Follow-up: Creates a follow-up/review process

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Note: *Current CAD machines can potentially be passed on to individuals within the organization needing less computing power, the machines are still high end for those purposes*

Current Condition — *Where do things stand today?*

- Each crash costs an individ... roximately 20 minutes of downtime between reb... where they left off and redrawing if any work wa...
- Roxanne Mellen of Boston has been keeping the # of crashes experienced on a daily basis since 6/1/09, the average number of daily crashes through 3/8/10 was (4).
- Other offices experience similar crash experiences, though the frequency is dependent on specific hardware/software conditions (see Root Cause analysis below)

Average of 4 crashes per day = approximately $80/day in lost productivity

6 (32 bit) planning machines
... be replaced at a rate of one
per ... sed on lost productivity
across th... le group

Goal — *What specific outcomes are required?*

Plan — *What activities will be required for implementation and who will be responsible for what and when?*

	Who	When
s.	KL	5/17/10
IT and CAD	JJ/CJ and Planning Mgr.	By 6/1/10
ctices on next	KL	By 6/1/10
s.	JJ	By 9/1/10

... and post transition.

Follow-up Actions — **What issues can be anticipated?**

1. Timing of hardware upgrades with database upgrades and TSI-EST implementation, we will need to address in staggered plan to implement upgrades.
2. Monthly review of individual planner system crash statistics to understand trends.
3. Continued system maintenance best practice sharing in bi-weekly BIM Forum calls.

... and TSI-EST implementation,
... t upgrades.
... tistics to understand trends.
... in bi-weekly BIM Forum calls.

LIMBACH

Key Points for Successful A3s

- Go and see, go and see, go and see!

- Decide which specific problem are you trying to solve

- Who is the audience

- What information would be useful to them

- What are the values and philosophies to which your story relates

- Tell the story in the context of those values – this is what ensures your A3 is meaningful to your audience

- Simplify

- Get visual

- Use a pencil

Example Status Report A3
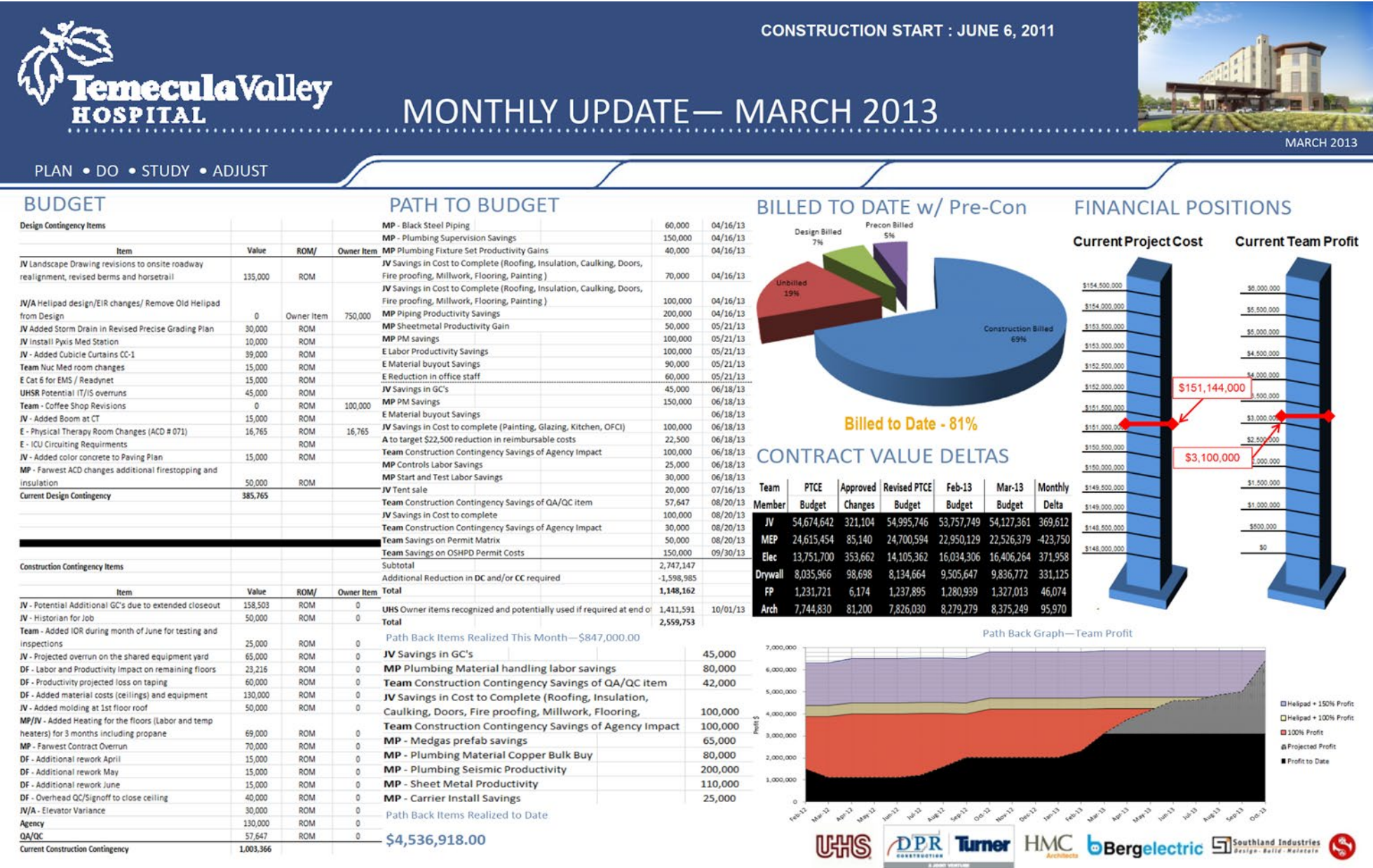
Example Status Report A3
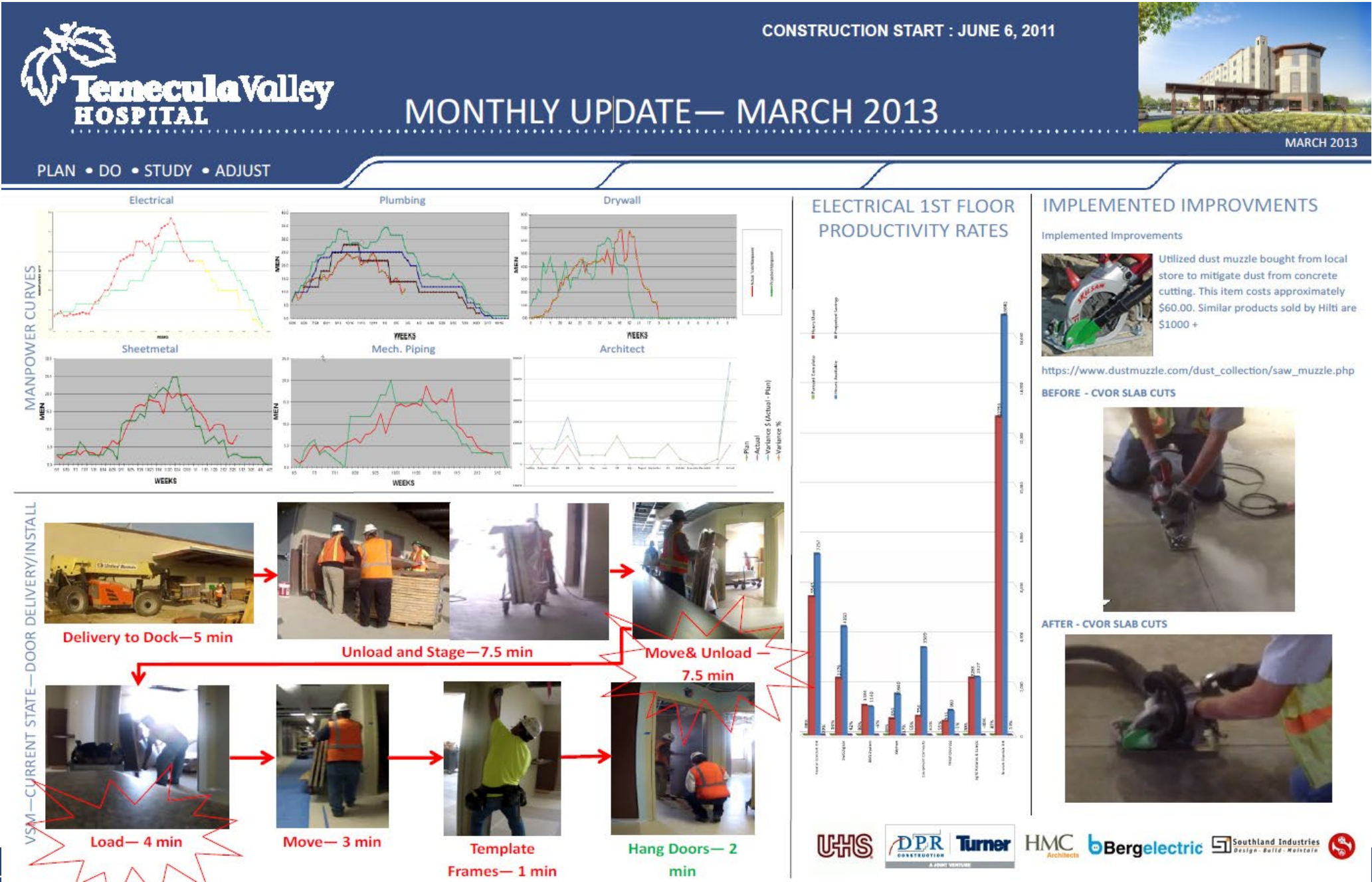
Example Proposal/Decision Making A3

PROJECT GES 002 Graham, NC

A3 NO.	TITLE	COLLABORATORS	CHAMPION
01	Floor Striping Options	Remus Brustur	Blake Brockmiller
DATE	WEEKS UNTIL T.O.	IMPACT TO SCHEDULE	IMPACT TO BUDGET
Nov 25	43 WEEKS	LOW	HIGH

BACKGROUND

Project GES 002 serves as a primary distribution center for GRDI, LLC. As a distribution center the owner desires for marked laydown areas, pedestrian walkways and various floor markings for safety and organization purposes. The warehouse portion of the building is approximately 859,000 SF and drawings show over 80,000 linear feet of marked floor striping.

CURRENT CONDITIONS

The owner has voiced a strong concern over the appropriate product to use in this situation. The product utilized for needs to be able to withstand high fork truck traffic and pallet storage throughout the building. The primary concern is edges chipping due to pallets and wear and tear from fork truck traffic.

GOAL

With the opportunity to address the need for a suitable product before work is to begin, Whiting-Turner has looked into numerous products and options for the floor striping. It is our goal to identify a product and solution that will meet the owner's desires for a lasting and durable product.

THE LINE STRIPING HAS 5 PROPOSED OPTIONS:

OPTION #1: ARMORSEAL TREAD-PLEX

Preparation Work: Acid wash to remove surface contaminants and lightly etch concrete

Application Process: 2 coats of paint at 4" wide

Cost: $125,009

Pros:
- Quick application time
- Minimal mess and disturbance to others
- Low Up-front cost

Cons:
- Lack of durability
- Poor bond to surface
- 1 year standard warranty

OPTION #2: TILE-CLAD HIGH SOLIDS: EPOXY COATING

Preparation Work: Grind the floor 4" wide at all striping locations

Application Process: 1 primer coat, 1 base coat, 1 seal coat

Cost: $183,701

Pros:
- Striping is at floor level
- Low Up-front cost
- Grinding allows a better surface to bond to

Cons:
- Grinding prep work causes dust and excess debris
- 1 year standard warranty

OPTION #3: TILE-CLAD HIGH SOLIDS: EPOXY COATING

Preparation Work: Shot blast 7" wide strip at all striping locations

Application: 2 base coats of 4" wide epoxy, 1 coat of clear seal across the 7" prep area

Cost: $3.20/linear foot = approximately $259,000

            $17.00/lane marker = approximately $41,000

Pros:
- This system will encapsulate the striping into the concrete floor
- Durable
- Smooth surface finish
- Local site visit available to view previous jobs

Cons:
- Shot blasting causes dust and excess debris
- 1 year standard warranty
- Causes disturbance 1.5" beyond each striped area to the floor unnecessarily

OPTION #4: INDUSTRIAL PLANT HIGH COATING SYSTEM

Preparation Work: Grind the floor 4" wide at all striping locations

Application: 1 primer coat, 1 base coat, 1 coat of clear seal

Cost: Line Striping = $371,546

            Lane Markers = $26,240

Pros:
- 5 year manufacturer warranty
- General Polymer system
- Manufacturer will make site visits to verify correct install
- Freezer area paint is specifically rated for temperature shock

Cons:
- Grinding prep work causes dust and excess debris

OPTION #5: 100% SOLIDS EPOXY COATING

Preparation: Grind the floor 4" wide and key all edges at striping locations

Application: 1 primer coat, 1 base coat, 1 seal coat

Cost: $4.90/linear foot = approximately $400,000

            $150.00/lane marker = approximately $360,000

Pros:
- System is "built into" the floor
- Clean and straight edges from detailed keying
- Single source manufacturer product– Cornerstone makes and installs their own product
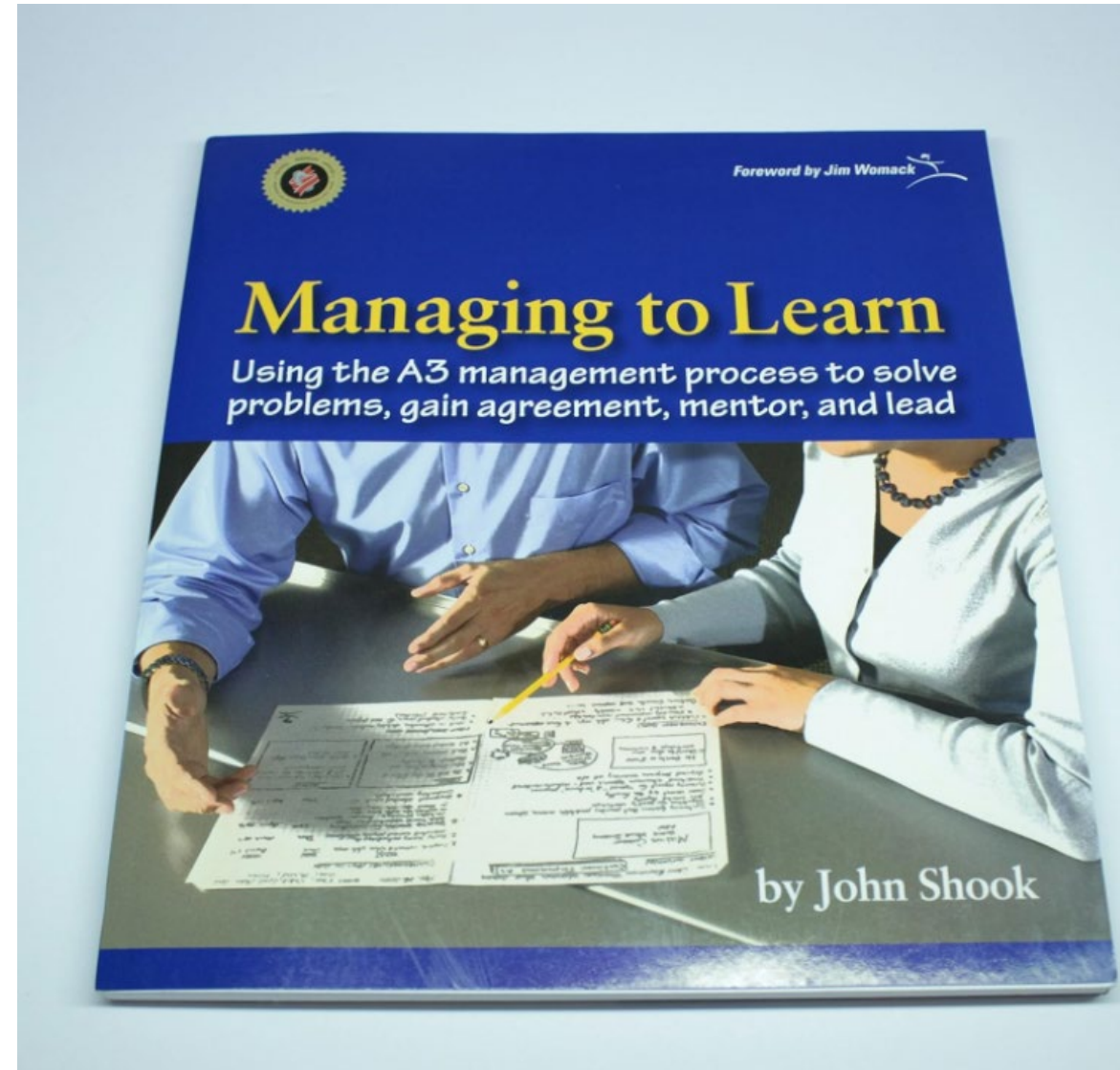
Cons:
- 200% more expensive than the next closest option
- Time consuming
- Requires areas to be completely inaccessible for periods of time
- 1 year standard warranty

Courtesy of Whiting-Turner

Further Reading

Contact Us

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E: juyar@balfourbeattyus.com

integrationpoint
Helping organizations align

C: 908-809-2659
E: kevin.labrecque@integrationpointllc.com

Questions

???

In the spirit of continuous improvement, we would like to remind you to complete this session's survey! We look forward to receiving your feedback.

26TH LCI CONGRESS
OCTOBER 22-25, 2024

Thank you for attending this presentation. Enjoy the rest of the 26th Annual LCI Congress!