Implementing Kanban Pull Systems in Non-Manufacturing Environments

July 20, 2010

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Your Instructor

❖ Early career as a scientist; migrated to quality & operations design in the mid-80's.

❖ Launched Karen Martin & Associates in 1993; applied Total Quality Management.

❖ Introduced to Lean in 2000.

❖ Specialize in Lean transformations in non-manufacturing environments.

❖ Co-author of *The Kaizen Event Planner;* co-developer of *Metrics-Based Process Mapping: An Excel-Based Solution*.

❖ Instructor in University of California, San Diego's Lean Enterprise program.

Karen Martin,
Principal
Karen Martin &
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❖ Participants will learn:

- What a kanban system is.

- The difference between kanban and FIFO lanes.

- How kanban-managed supply systems benefit organizations.

- The step-by-step process for implementing a simple two-bin kanban systems.

  - The role of 5S in establishing a kanban system.
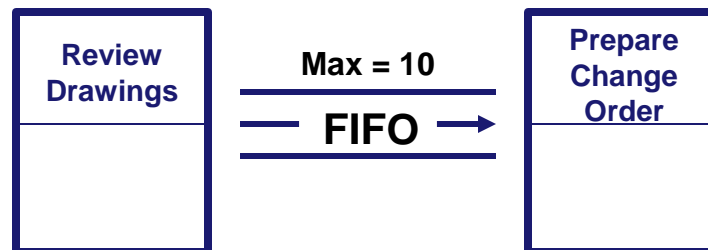
Kanban - Defined

❖ Kanban
- A visual signal of some kind
  - Sign, signboard, card, doorplate, poster, billboard, etc.
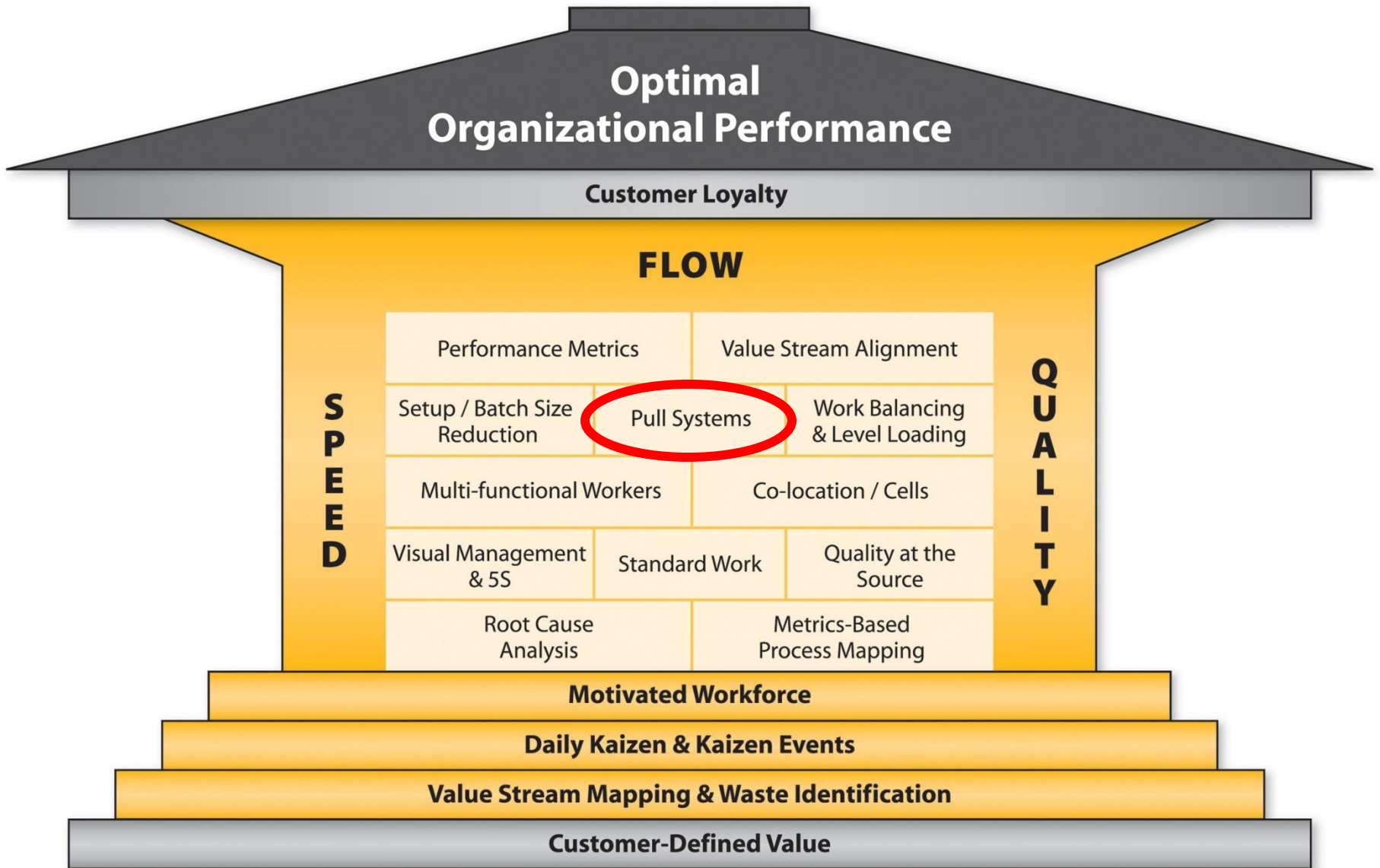
❖ Kanban system
- A just-in-time pull system whereby items are replenished at the rate they are consumed.
- Low tech, highly visual pull system for inventory management

❖Kanban systems are used when you're replenishing *specific items/part numbers (supplies)* based on consumption.

❖FIFO lanes are used when you're replenishing *work* based on consumption.

- Maximum WIP allowed is established.
- All upstream work stops once max is reached.

Review Drawings	Max = 10 FIFO →	Prepare Change Order

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Building a Lean Enterprise

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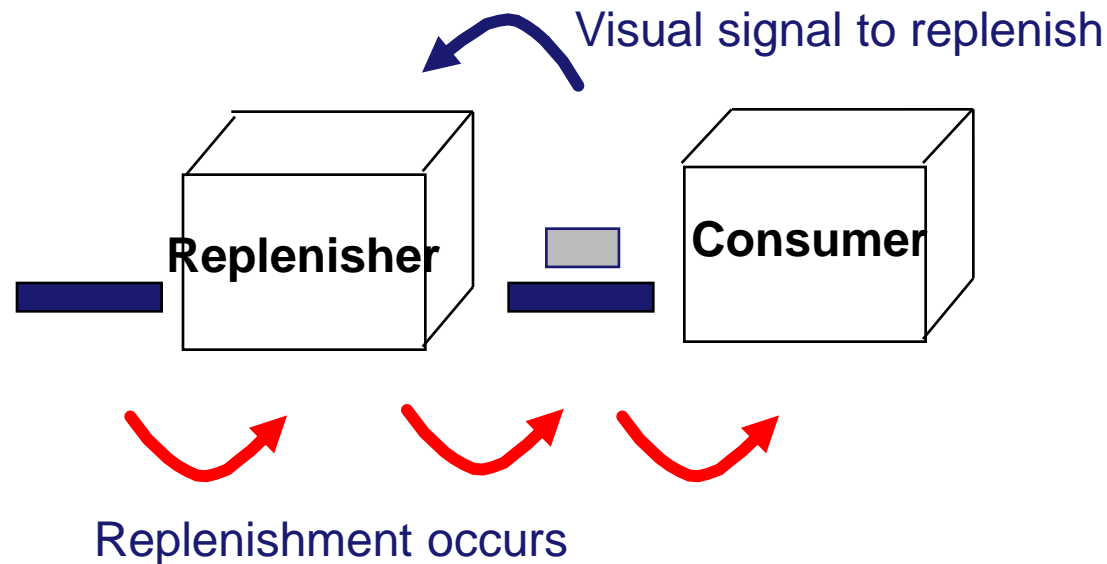
Pull System Mechanics

Concept: Consumption by downstream process authorizes replenishment by upstream process

Visual signal to replenish

Replenisher   Consumer

Replenishment occurs

How are supplies typically managed?

❖ Storage issues
- Multiple locations and "secret stash."
- Not stored next to where they're consumed.
- Like items not stored together.
- Similar items not differentiated.

❖ Management issues
- Labor intensive
- Re-orders based on forecasts rather than actual use.

❖ Ordering issues
- Unclear accountability.
- Volume discounts often drive quantity ordered.
- No criteria for ordering.

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Kanban Benefits

- ❖ Prevents carrying excessive inventory.
  - ○ Reduced cash flow
  - ○ Excessive space requirements
- ❖ Prevents stockouts / reduces expediting expenses.
- ❖ Forces stock rotation to reduce risk of obsolete, damaged, or expired inventory.
- ❖ Requires less effort and fewer resources to manage.
- ❖ Improved compliance (healthcare).
- ❖ Drives discipline into the organization.

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❖ Overproduction

❖ Inventory

❖ Waiting

❖ Over-Processing

❖ Errors

❖ Motion (people)

❖ Transportation (material/data)

❖ Underutilized people
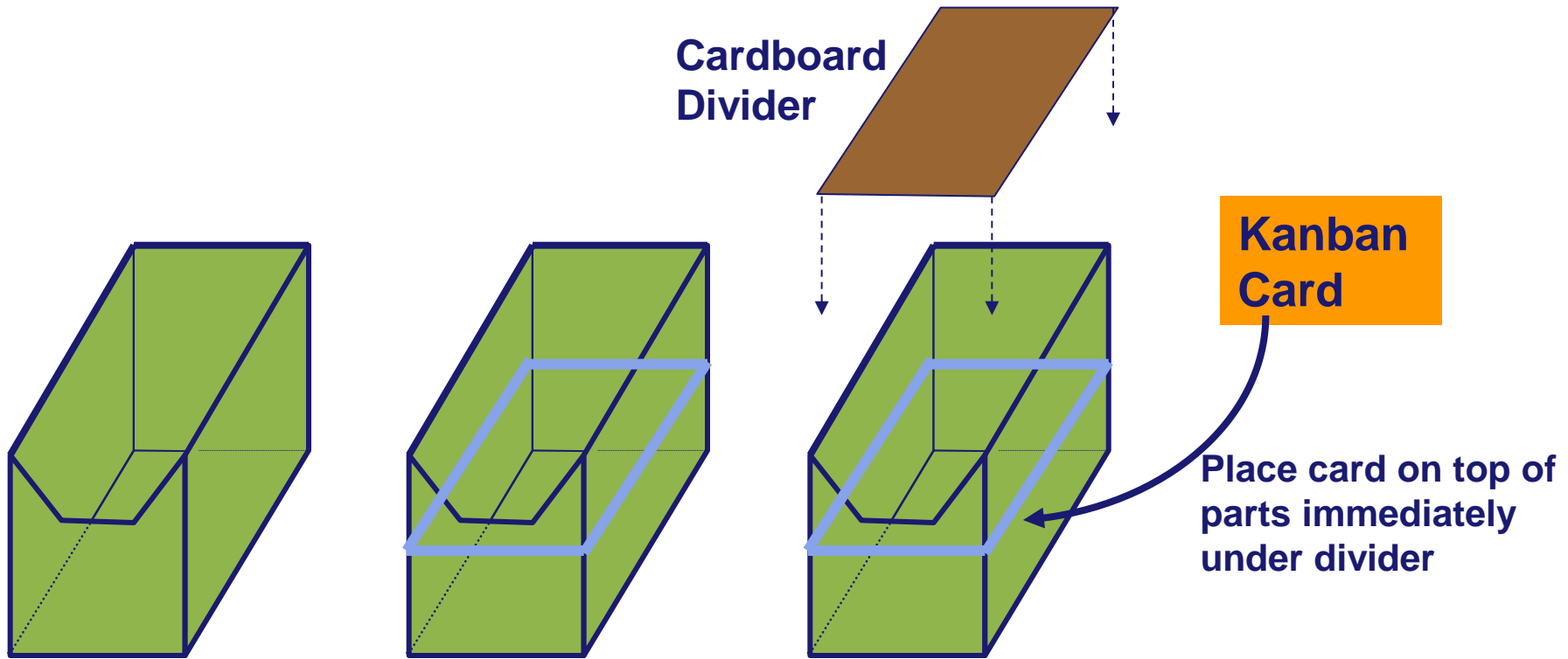
A well-designed kanban system eliminates every single one!

Types of Kanban Pull Systems

❖ One-bin system, divided into two sections

❖ Two-bin system

- Arrangement options
    - Front and back
    - Side-by-side
    - Top and bottom
- Color or no color

❖ Three-bin system – supplier involved

❖ Tape

❖ Conveyors

❖ Shadow boards

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Single Bin Kanban System

Cardboard Divider

Kanban Card

Place card on top of parts immediately under divider

(1)
Appropriate Sized Bin (kanban quantity fits into one bin)

(2)
Draw Line Inside Pan at Order Point Level

(3)
Insert Cardboard Divider to Create Physical Barrier

Two-Bin Kanban

Kanban card w/ reorder info

Two-Bin System / Bar-Coded / No Card

Red bin in front = Replenish

Blue bin in front = Do not replenish

Item # and reorder quantities built into computer system

Side-by-side Color Bins:
Red Arrows Signal Need to Replenish

Top/Bottom Color Bins:
Red Arrows Signal Need to Replenish

Kanban Cards

Typical information on kanban cards:

• Supplier
• Item/part #
• Reorder quantity

Two-Bin System

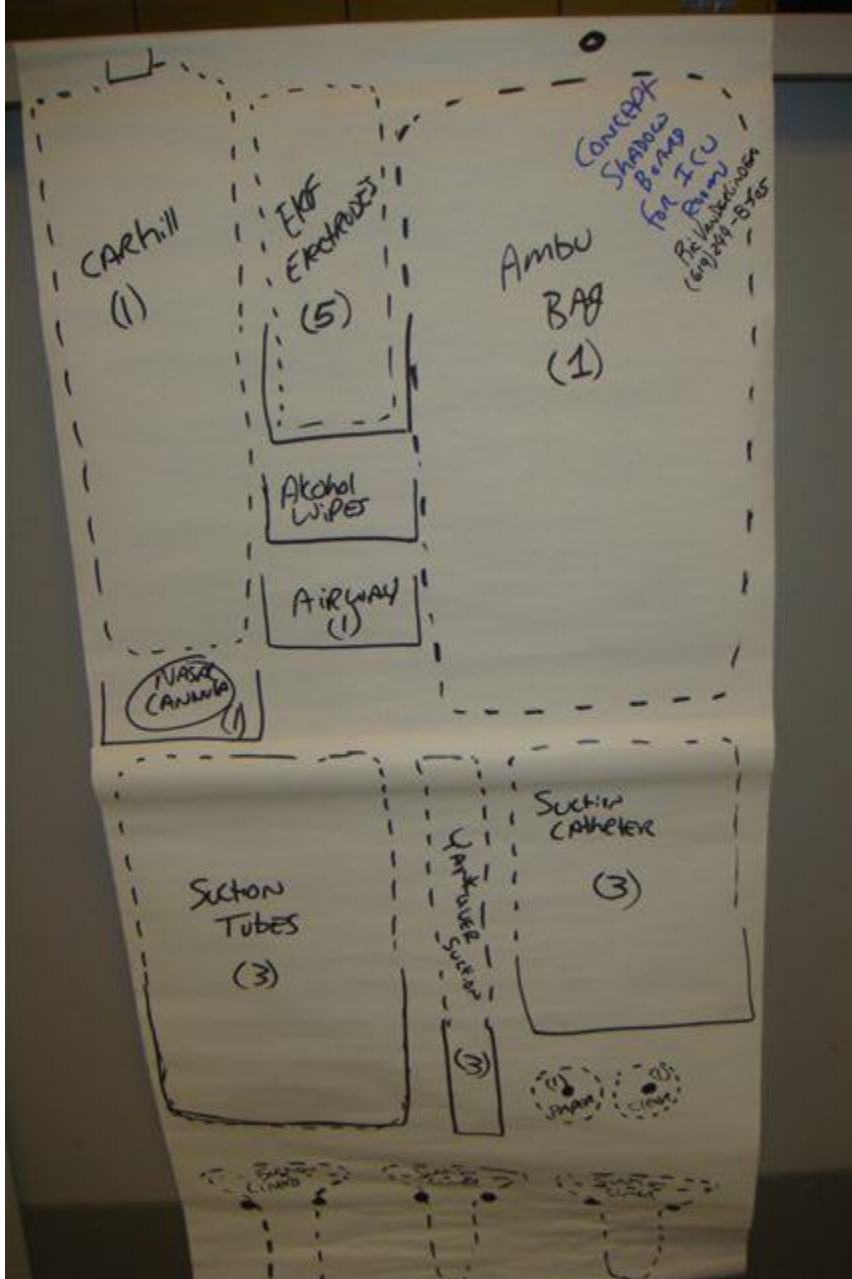## Front

Back

Tape Kanban

Do not replenish

Replenish

Conveyor Kanban

Replenish when first empty bin moves into red area

Shadow Boards

❖ Bin Quantity = (ADU x LT) x (1 + SS%)

- ADU = Average daily use
- LT = Supplier lead time (in days)
- SS% = Desired safety stock percentage, expressed as a decimal (e.g. 30% = 0.30)
    - Safety stock can vary by item
    - Typical beginning SS = 50% & reduces over time
- **Note:** You can use different time periods as long as the units of measure for demand and LT are the same.

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Typical Two-Bin Calculation - Example

❖ Scenario

- 40 used per day
- Supplier delivers twice a week
- Item always in stock
- 30% safety stock desired.

❖ Bin Quantity = (ADU x LT) x (1 + SS%)

❖ Bin Qty = (40/day x 2.5 days) x (1 + 0.3)

- = 100 items x 1.3 items
- = 130 items *per bin*

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Setting up Two-Bin/Two-Card Kanban System

- ❖ Considerations for selecting bins:
  - ○ Size of the item
  - ○ Frequency of use (data needed!)
    - ▪ Plus safety stock desired (30-50%) – may need to resize for seasonal demand
  - ○ Supplier rate of replenishment / frequency of delivery
- ❖ Other bin considerations
  - ○ Space available
  - ○ Budget
- ❖ Methodology for replenishment notification
  - ○ Scanners
  - ○ Laminated cards
    - ▪ Stored next to inventory; collected by a "water spider"

AkroBins available through Grainger, 5S Store, etc.

SHELVING & STORAGE
Bins & Dividers

AkroBins® and Dividers

Sturdy polypropylene bins and dividers work together to provide custom storage solutions.

AKROBINS®

Use on shelving, louvered panels, workbench racks, carts, and most other rail and louvered systems — or simply stack. Can be hung from dual utility cart featured on page 1698.

Full-width hanger lip supports heavy loads. Reinforced rib design prevents sides from spreading when loaded or stacked. Slot on front panel holds inventory cards or large labels.

DIVIDERS

Lengthwise dividers keep items separated in bins and do not interfere with stackability. Black copolymer plastic. Sold in packages of 5.

No. 2W074

No. 2W780

No. 5W873

Outside Dimensions (In.) W	D	H	Akro-Mils Model	Red	Item No. Blue	Yellow	Green	$ Each	$ Lots	Lots Qty.	Shpg. Wt.
AKROBINS®											
4¼	5⅜	3	30-210	2W072	2W776	5W869	2RV65	1.02	0.97	96	0.1
4¼	7⅜	3	30-220	2W073	2W777	5W870	2RV66	1.79	1.70	96	0.2
4¼	10⅞	4	30-224	2RV94	2RU96	2RV98	2RY10	2.85	2.70	48	0.5
5¼	10⅞	5	30-230	2W074	2W778	5W871	2RV67	4.55	4.33	48	0.6
11	10⅞	5	30-235	5W365	5W867	5W872	2RV69	6.69	6.36	24	0.9
16½	10⅞	5	30-255	2RV86	2RU90	2RV88	2RV92	9.09	8.65	24	1.0
8¼	10⅞	7	30-239	5W366	5W868	5W873	2RV70	7.38	7.01	24	1.1
5⅜	14½	5	30-231	4TJ77	4TJ76	4TJ78	2RV68	8.16	7.76	48	0.8
8¼	14⅞	7	30-240	2W075	2W779	5W874	2RV71	8.93	8.49	48	0.7
16⅜	14⅞	7	30-250	2W076	2W700	5W875	2RV72	12.46	11.03	24	3.5
8¼	18*	9	30-285	5YM92	5YM91	5YM93	2RV73	16.88	16.03	4	2.0
16¼	18*	11	30-270	5YM95	5YM94	5YM95	2RV74	24.30	23.09	12	3.4

(*) 18" deep bins are not recommended for use on rail and louvered hanging systems.

Fits Opening (In.)	Outside Dimensions (In.) H	L	Akro-Mils Model	Item No.	$ Each Pkg.	Shpg. Wt.
Dividers						
3¾L	2⅞	4	40210	5KY84	3.61	0.2
7¾L	2⅞	5	40220	5KY85	3.92	0.2
10¾L x 5H	4⅞	9	40230	5KY86	6.60	1.0
10¾L	6⅞	8	40239	5KY87	7.47	1.5
14¾L x 7H	6¾	12	40245	5KY88	9.11	2.1
16L x 6H	5¾	14.6	40265	5KY89	16.25	3.5
16L x 11H	10¾	13⅜	40270	5KY90	17.59	4.1

No. 2RV92

Dimensions (in inches)				Red		Blue		Yellow		Green	
Depth	Width	Height	Akro #	Grainger #	Qty	Grainger #	Qty	Grainger #	Qty	Grainger #	Qty
5 3/8	4 1/8	3	30-210	2W072		2W776		RW869		2RV65	
7 3/8	4 1/8	3	30-220	2W073		2W777		5W870		2RV66	
10 7/8	4 1/8	4	30-224	2RV94		2RV96		2RV98		2RY10	
10 7/8	5 1/2	5	30-230	2W074		2W778		5W871		2RV67	
14 3/4	5 1/2	5	30-234	4TJ77		4TJ76		4TJ78		2RV68	
10 7/8	16 1/2	5	30-235	5W865		5W867		5W872		2RV69	
10 3/4	8 1/4	7	30-239	5W866		5W868		5W873		2RV70	
14 3/4	8 1/4	7	30-240	2W075		2W779		5W874		2RV71	
14 3/4	16 1/2	7	30-250	2W076		2W780		5W875		2RV72	
10 7/8	16 1/2	5	30-255	2RV86		2RV90		2RV88		2RV92	
18	8 1/4	9	30-265	5YM92		5YM91		5YM93		2RV73	
18	16 1/2	11	30-270	5YM95		5YM94		5YM96		2RV74	

KANBAN BIN ORDER FORM - AkroBins® - p. 1796 Grainger catalog 398

❖Use 5S methodology to establish the kanban system.

- Sort
- Set in order
- Shine
- Standardize
- Sustain

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Plan

Do

Act

Check
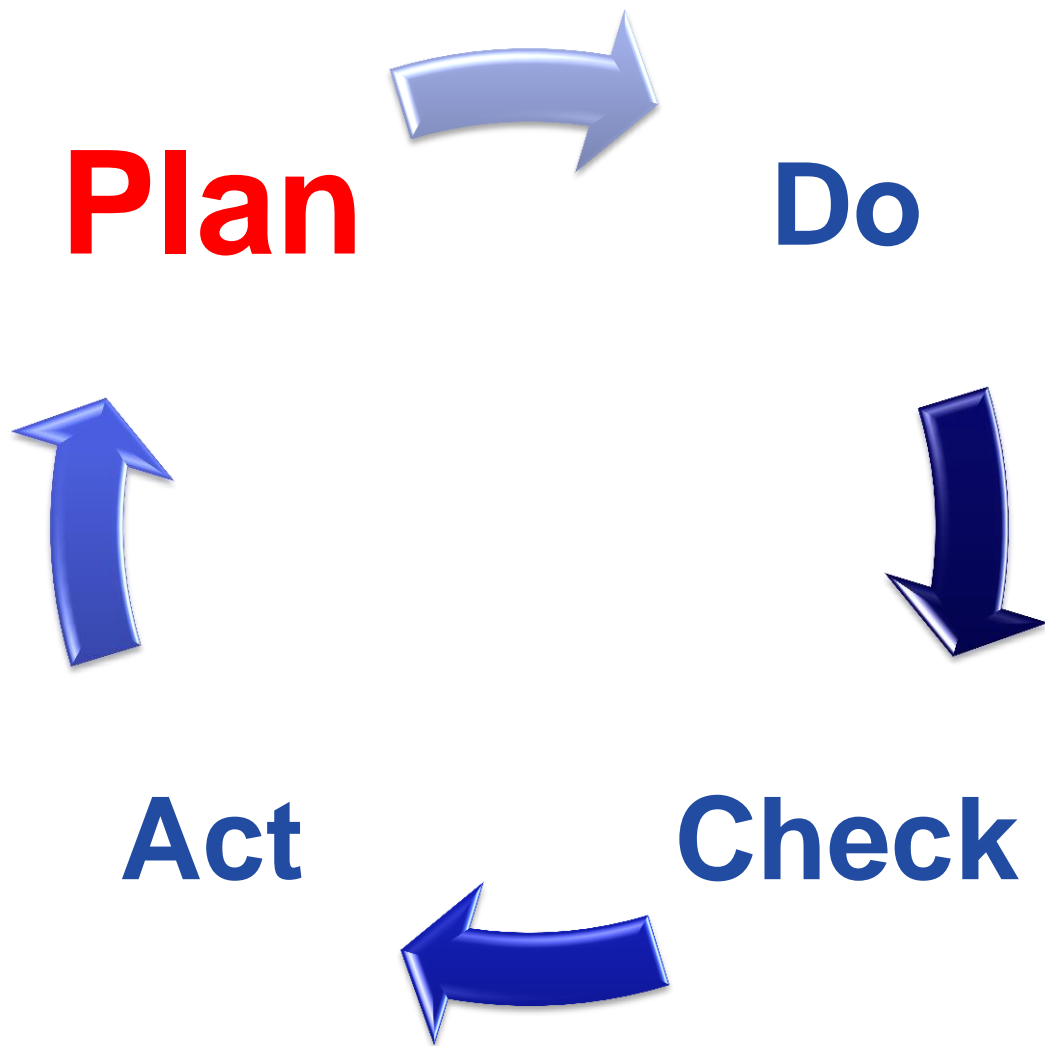
❖ Communicate improvement need and plan to **all** stakeholders.

- Use data to sell the need

- Explain WIIFM (what's in it for me)

- Include high level plan re: dates, who will be involved, etc.

  - It may be disruptive to the workplace. If so, communicate likely impact and for how long.

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❖ Obtain relevant current state data:

- Items
  - # of different types
  - Quantity on hand
  - Quantity expired/obsolete/damaged items
  - ***Consumption* rate (this is critical – will determine bin size!)**
- Replenishment timeframe
- Annual spend
- Stock-outs
  - Financial or customer impact
  - Expediting costs
- Pre-improvement audit
- Pre-improvement staff survey

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Pre-Improvement Audit

Visual Inventory Management Audit

Department: _____
Date: _____
Auditors: _____

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	Desired Attribute	1 0-30%	2 31-55%	3 56-75%	4 76-95%	5 95-100%	Root Cause	Corrective Action
1	Material doesn't exceed kanban bin quantities							
2	No stockouts (both bins empty)							
3	Stock has been rotated							
4	No expired items							
5	Materials properly identified							
6	Each item has a specific place							
7	Bin sizes are appropriate for daily demand							
8	Standard work for supplies replenishment and use is posted							
9	Accountability for supplies management is clearly identified							
10	No material in unidentified locations							
11	Evidence of root cause analysis							
12	Storage areas are clean and tidy							

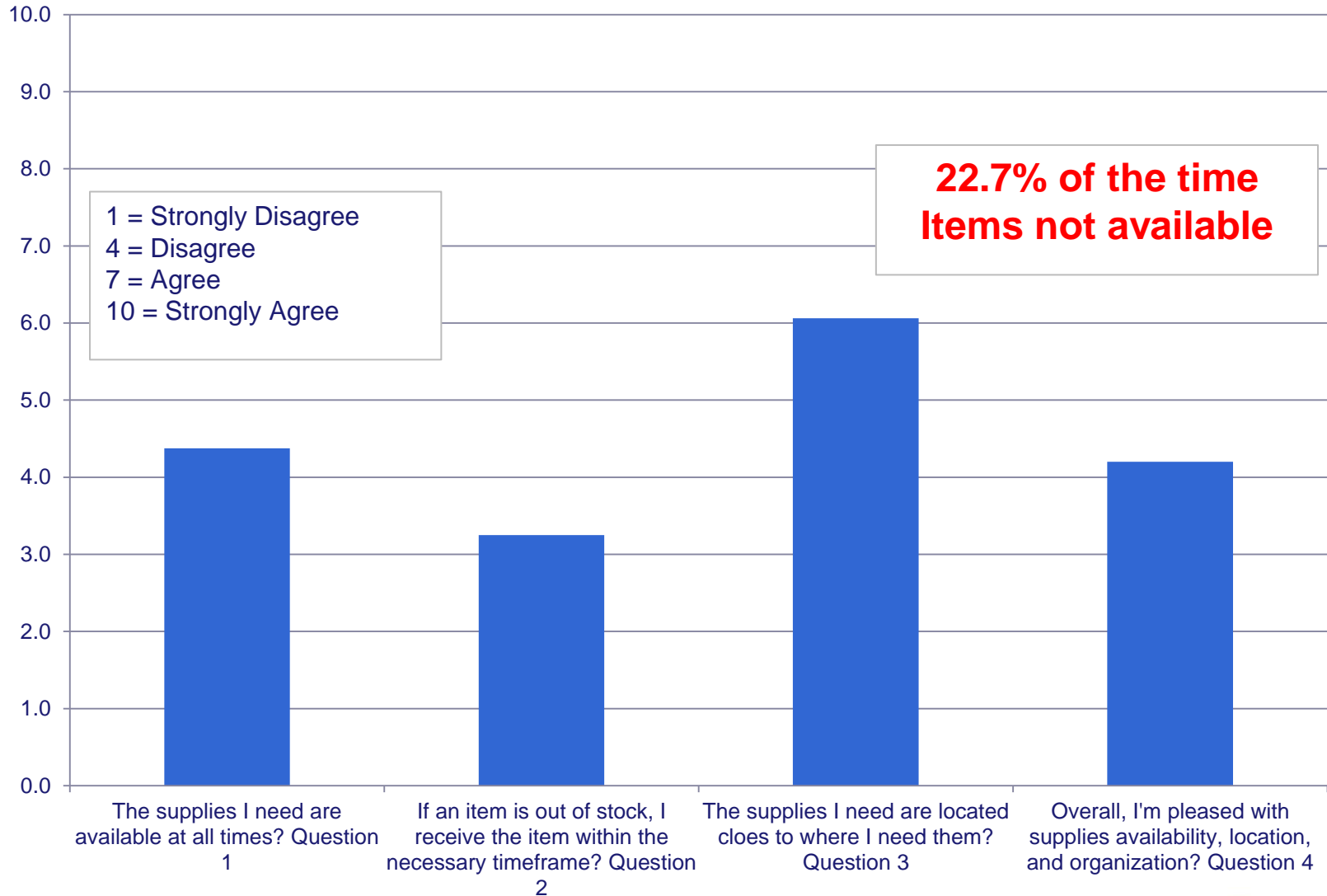**Comments:**

Gather Baseline Data

Supplies Management Survey – Staff

Name (optional):_____ **Date:** _____

Title/Role (optional): _____ **Area/Dept:** _____

	Strongly Agree (4)	Agree (3)	Disagree (2)	Strongly Disagree (1)
1. The supplies I need are available at all times.	☐	☐	☐	☐
2. If an item is out of stock, I receive it within the necessary timeframe.	☐	☐	☐	☐
3. The supplies I use are located close to where I need them.	☐	☐	☐	☐
4. Overall, I'm pleased with supplies availability, location, and organization.	☐	☐	☐	☐

5. How often do you obtain supplies from your dept's "official" stock locations? _____ times per *day*

6. How often is an item you need out of stock? _____ times per *week*

7. What improvements would you like to see related to the supplies/materials you use? _____

_____

Pre-Improvement Staff Survey

1 = Strongly Disagree
4 = Disagree
7 = Agree
10 = Strongly Agree

22.7% of the time Items not available

The supplies I need are available at all times? Question 1

If an item is out of stock, I receive the item within the necessary timeframe? Question 2

The supplies I need are located cloes to where I need them? Question 3

Overall, I'm pleased with supplies availability, location, and organization? Question 4

❖Form cross-functional team

- Consumers (include frontline reps)
- Replenishers (Purchasing? Admin? Materials?)
- Inventory "owners"
- Supplier rep?

❖Establish sort area

❖Gather cleaning and organization supplies

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Plan **Do**

Act **Check**

❖ Determine items truly needed.

❖ Label items (if categories).

- Red – get rid of
  - Return for credit, if possible
- Yellow – keep, but move location
  - Includes overstock that you'll draw from until consumed
- Green – keep where is

❖ Gain consensus on dispositioned items.

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❖ Determine where each item will be stored. Considerations:

- Central storage vs. point-of-use stores vs. both.

- Ergonomics.

- Store related items together.

- Error-proof items easily confused by using color, signage, etc.

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❖Done in conjunction with Step 2.

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❖ Install kanban.

- Label bins
- Place items in bins, based on quantities calculated
- Arrange as relevant; add cards as relevant
- Store excess material away from supply area; consume before additional orders are placed.
- Labels storage areas, if needed

❖ Design standard work for ordering, receiving, kanban use, etc.

❖ Install visuals / standard work aids.

❖ Train staff.

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Color-Coded Two-Bin Kanban System

Blue & Red Bins –

Regular Stock

Managed by Central Materials Department

Yellow Bins –

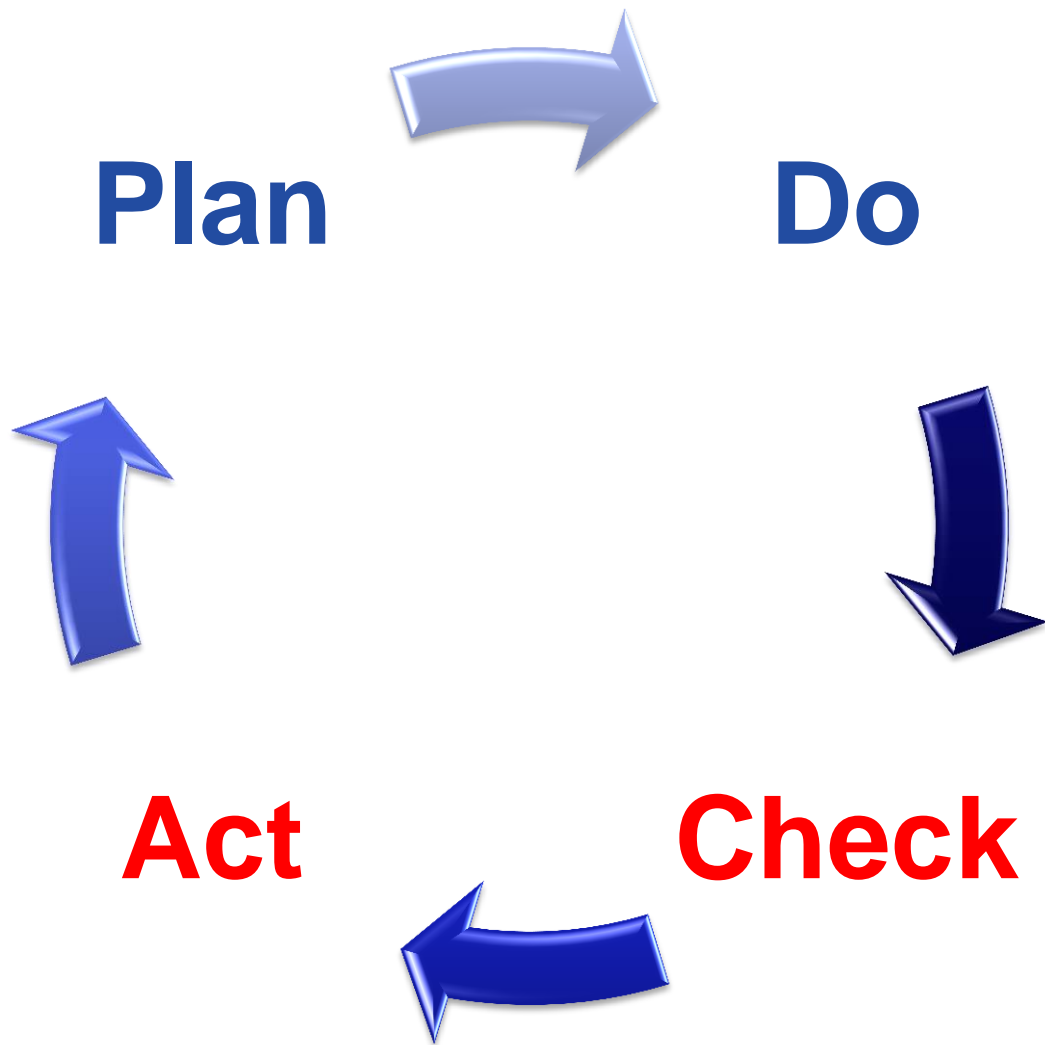**Special Orders**

Managed by Functional Department

Standard Work – Kanban Procedures

Plan **Do**

Act **Check**
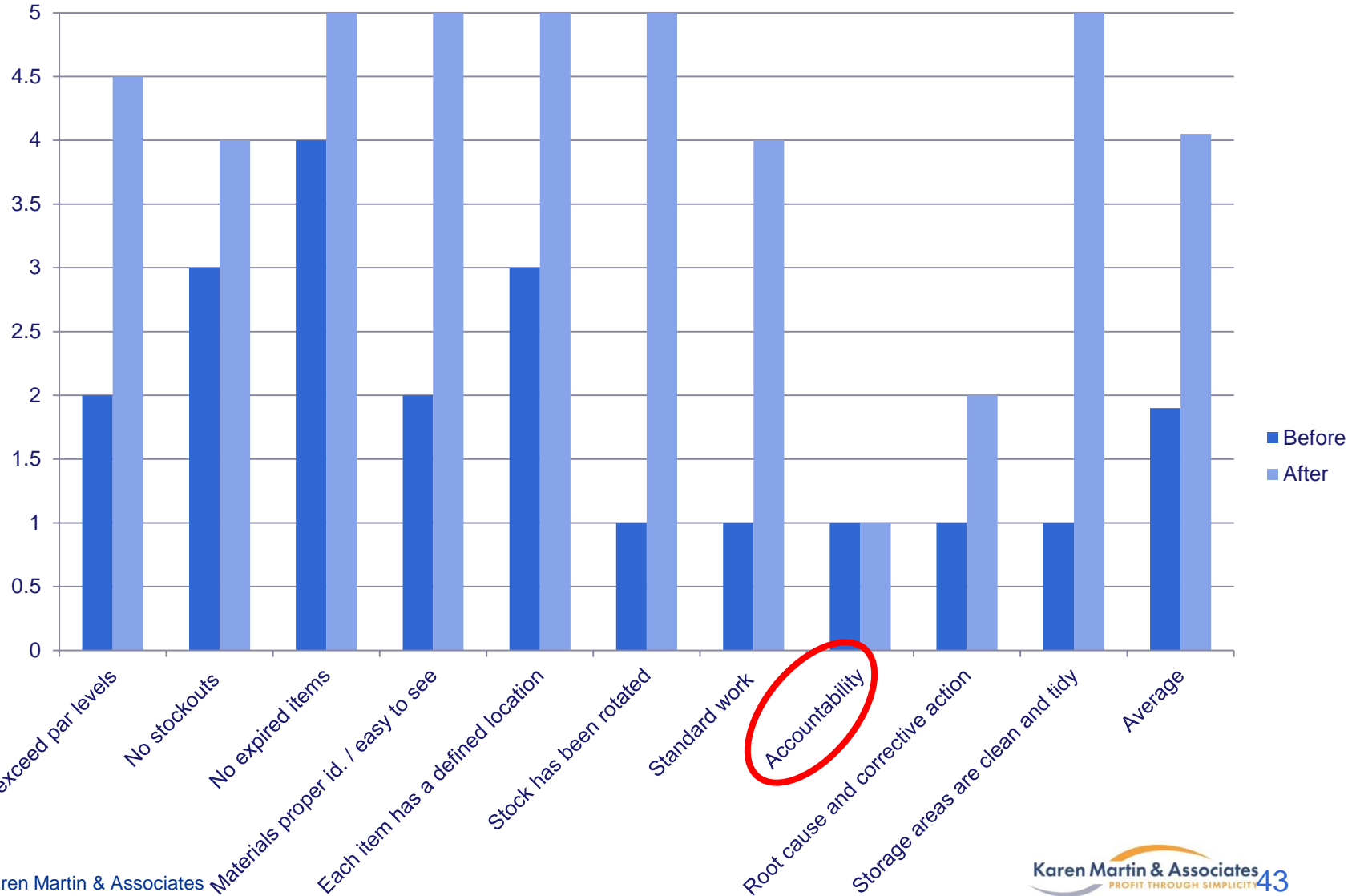
❖ Determine clear ownership.

❖ Monitor frequently at first; reduce as stabilization occurs.

❖ Adjust as needed.

❖ Gather post-improvement data.

❖ Re-survey staff a month or two after installation.

❖ Communicate results.

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Pre & Post Audit Results

Legend: Before (dark blue), After (light blue)

Category	Before	After
Material doesn't exceed par levels	2	4.5
No stockouts	3	4
No expired items	4	5
Materials proper id. / easy to see	2	5
Each item has a defined location	3	5
Stock has been rotated	1	5
Standard work	1	4
Accountability	1	1
Root cause and corrective action	1	2
Storage areas are clean and tidy	1	5
Average	1.9	4.05

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Kanban Success Story

Before

- 56% ↑ in office supply budget over 2 yrs w/ no additional staffing
- Printer cartridges = 50% of the budget
- 128 cartridges on hand; 564 used annually
- $18,732 inventory; $8,000 of obsolete cartridges

After

- Working to carrying $5,000 max inventory at a time
- Freed 32 sq. ft of space
- Happy staff, happy leadership
- Standardized ordering process
- Working to reduce printer types; will reduce inventory further

❖ If people don't see a problem, they won't be motivated to change.

- Highlight the problem – use data!
- Put the problem into context
  - Explain why the problem's a problem
- Show them the organizational **and personal** benefits of a change (WIIFM?)
- Engage them in the solution
  - Teach about two-bin systems
  - Have them participate in creating and managing it

❖ Participants will learn:

- What a kanban system is.

- The difference between kanban and FIFO lanes.

- How kanban-managed supply systems benefit organizations.

- The step-by-step process for implementing a simple two-bin kanban systems.

  - The role of 5S in establishing a kanban system.

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Upcoming Webinars

Topic	Date
Work Standardization & Metrics-Based Process Mapping	Tuesday, August 10
Error-Proofing	Thursday, August 12
Kaizen Events – Part I	Tuesday, August 31
Kaizen Events – Part II	Thursday, September 2
A3 Problem-Solving – Part I	Tuesday, September 28
A3 Problem-Solving – Part II	Thursday, September 30

Register at www.ksmartin.com/webinars

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