Implementing 5S in a laboratory environment

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What is 5S?

- The 5S system is a tool that supports an operating philosophy that emphasizes discipline, efficiency, and attention to detail

- 5S is an enabler of waste-free production

A lean organization is clean and orderly
A clean & orderly organization may not be lean

Why Use 5S?

- Disciplined approach to an organized workplace
- Encourages a culture of **responsibility**

Benefits of 5S

- ✓ **Safety**
- ✓ **Employee involvement**
- ✓ **Organization/Efficiency**
- ✓ **Cleanliness**
- ✓ **Space Savings**
- ✓ **Lower inventories**
- ✓ **More consistent experiments**
- ✓ **Faster onboarding of new employees**
- ✓ **Timely delivery of supplies**
- ✓ **Additional funding**

The 5S's

1. Sort
2. Set in Order
3. Shine
4. Standardize
5. Sustain

1. Sort

- Document baseline work area “before” condition (pictures, audits, etc.)
- Perform the initial cleaning of the work area
- Separate the necessary items from unnecessary items
- Remove unnecessary items from the work area

Examples

1. Sort

Sorting Methodology:

- Establish a holding area for items (Red tag area)
- Identify items not required at the current location, if at all
- Team members evaluate items in Red Tag area
- Dispose of items with team approval

2. Set in Order

- Identify necessary tools, equipment, supplies, etc.
- Determine location for necessary items
- Designate & outline permanent locations for items

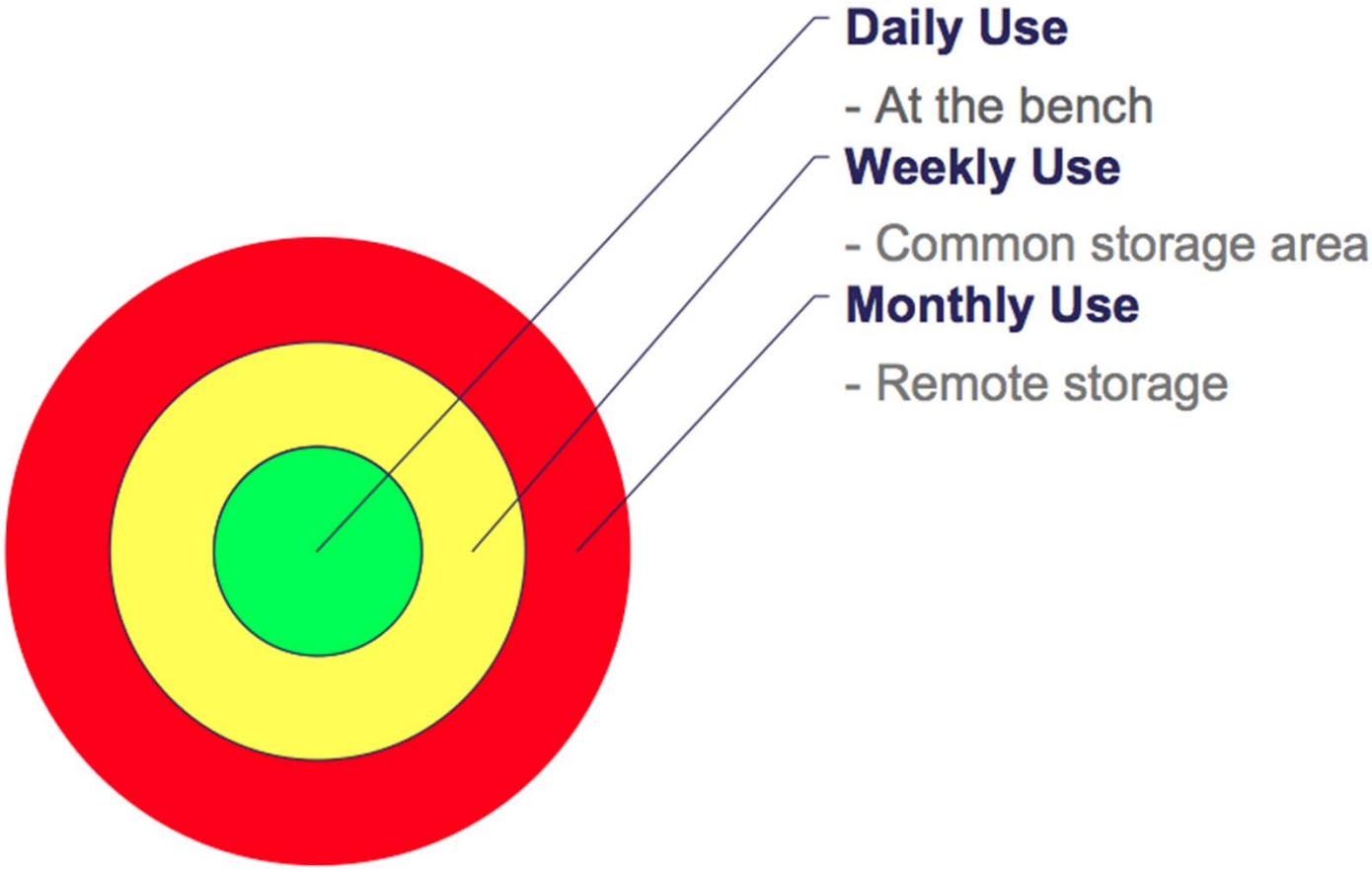
Example

Everything in the area has a marked location!!

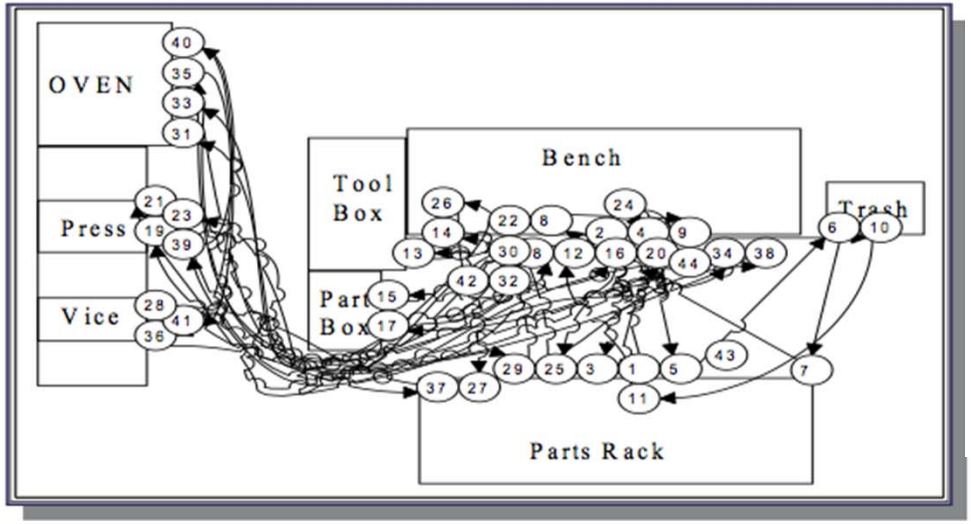
How to set in order

- Define the major processes performed
- For each process, draw a map of the locations of each activity
- Identify sources of waste and corrective measures
- Position items where they are needed based on frequency

Item location considerations

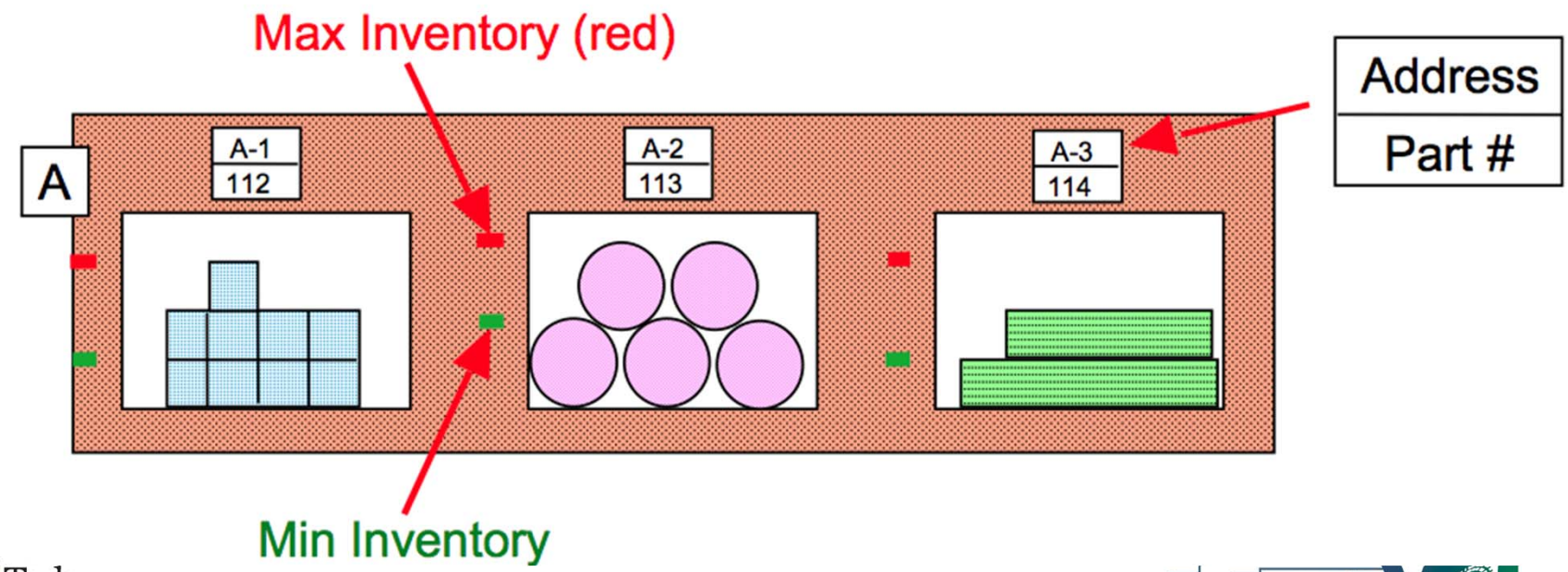


Streamline activity



Organization of Supplies

- Determine address system with part number and address
- Label container with part number
- Note minimum & maximum quantity (if appropriate)



Example Stocking/Replenishing Systems

2 Bin System

Min Max

Set in Order Examples

Before

After

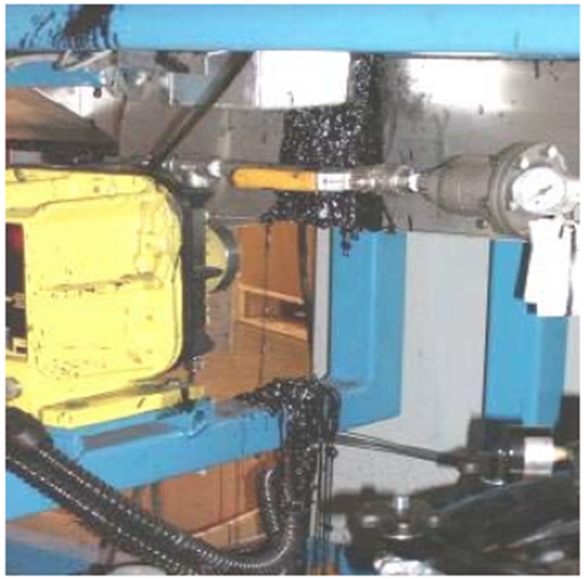
Before

After

3. Shine

- Clean area thoroughly – Make it shine!
- Clean & inspect areas daily

Examples



3. Shine

Machines & Equipment

- Fix leaks & other problems
- Prevent contamination
- Inspect daily
- Fix potential issues before they become major problems

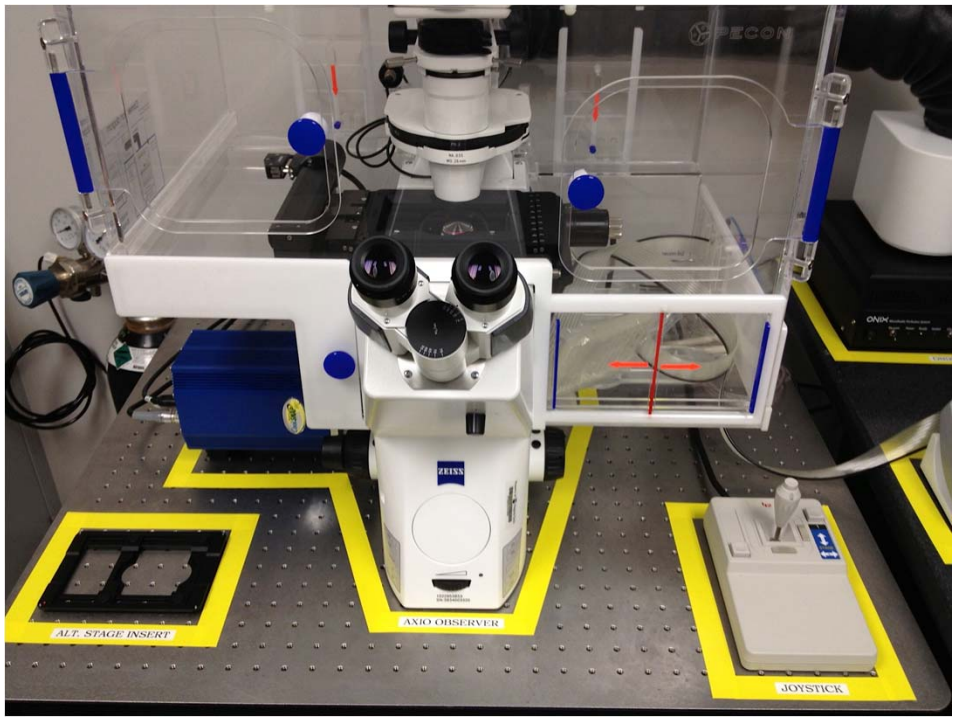
4. Standardize

- Develop SOPs
- Document equipment & processes
- Develop audit schedule and assign tasks to individuals
- Establish a methodology to ensure consistent strategy for 5S implementation

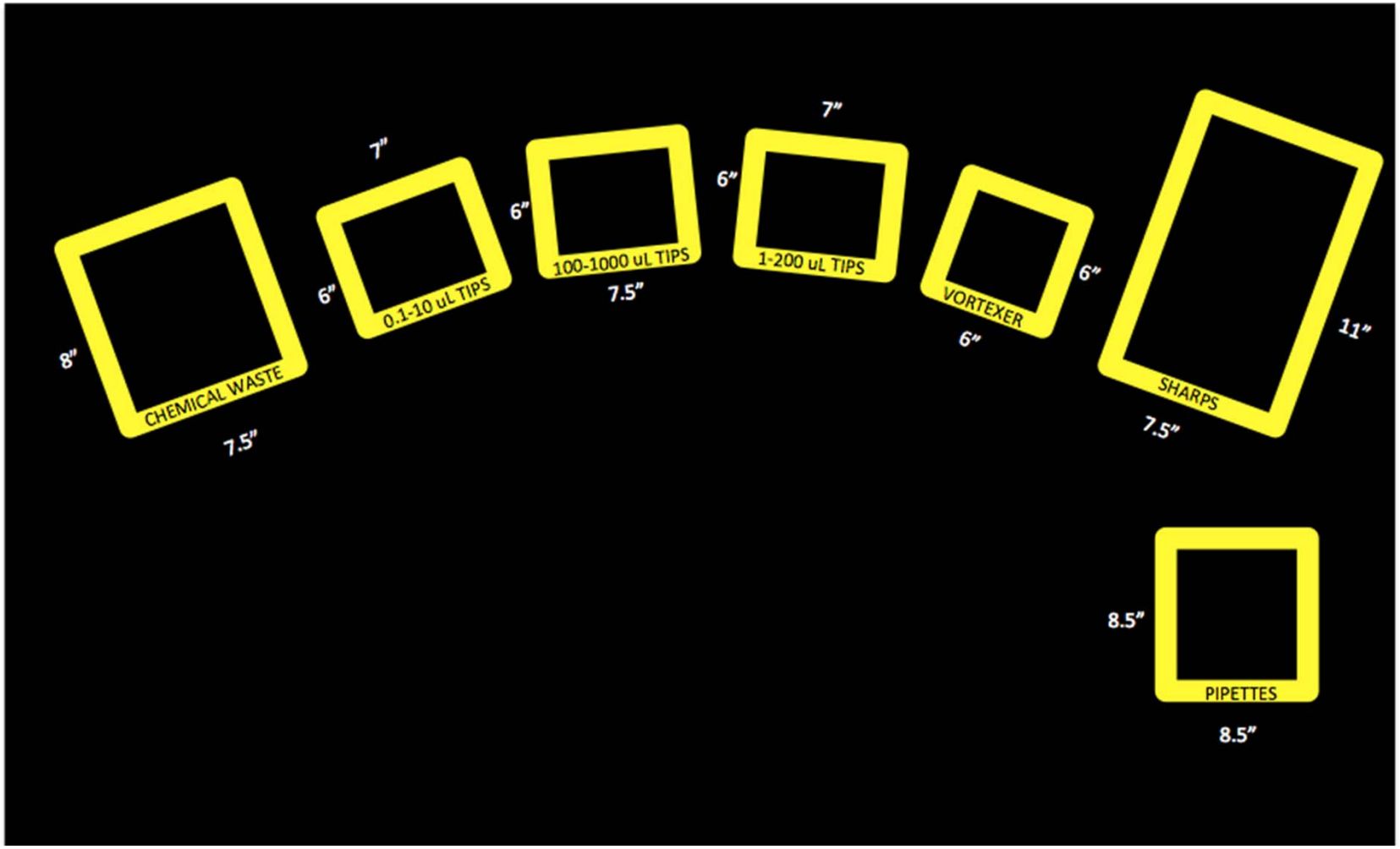
5S Taping Standards

Tape Color	Application	Examples
	Permanent location for equipment	Equipment, cabinets, furniture, waste baskets
	Temporary storage location	WIP, Finished Goods, Carts
	Biohazards	Biohazard waste collection containers
	Hazardous chemical waste	Chemical waste collection containers
	Safety equipment	Eye wash stations, safety showers, spill kits, respirators
	Radiation	Radioactive waste collection containers
	Electrical equipment access	Area in front of electrical panels and switch gear
	Fire and emergency equipment	Fire extinguishers, doors, panels
PPE Required	Change in protective equipment requirements	Designated PPE (safety glasses, lab coats, etc.) required past this line.

Taping Example: Microscope Room



Standard Bench Layout



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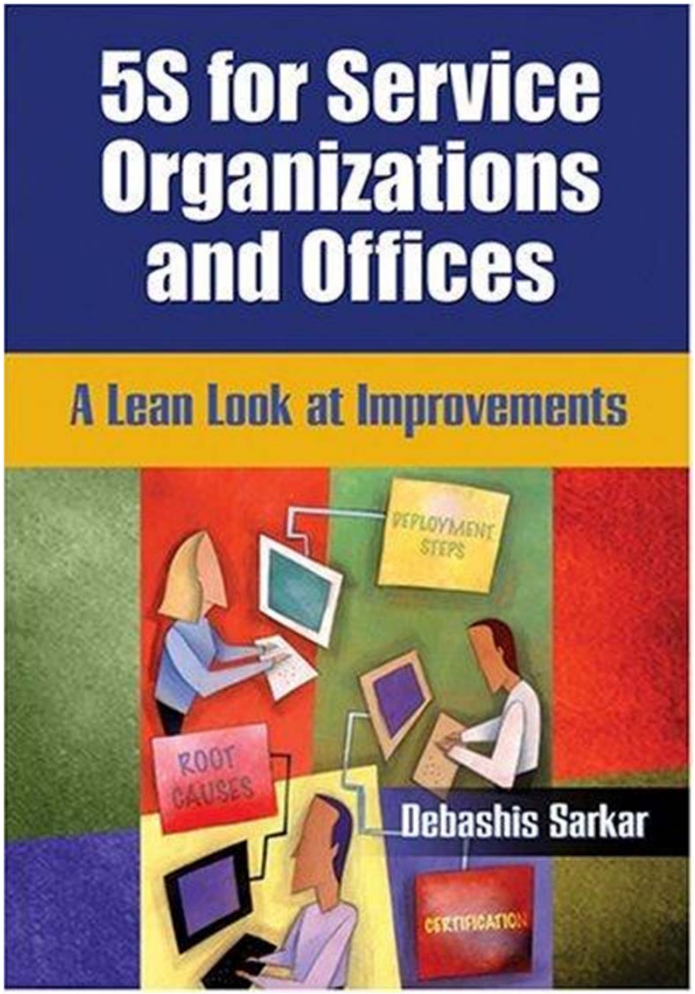
Pictures

Bench Top Hood

=

Desired State

5. SUSTAIN


5S for Service Organizations and Offices
A Lean Look at Improvements
DEPLOYMENT STEPS
ROOT CAUSES
CERTIFICATION
Debashis Sarkar

Enablers

- Structures
- Processes
- Infrastructure
- Practices

Enablers

- Structures
  - 5S Council
  - 5S Office
- Processes
- Infrastructure
- Practices

5S Council

- Implementation roadmap
- Sets Measures of Performance (MOPs)
- Reviews progress
- Approves policies
- Decisions on proposed changes

5S Office (Subset of Council)

- Reports progress
- Prepares training material
- Creates policies & practices for 5S

Enablers

- Structures
- Processes
  - 5S charter
  - 5S Implementation Sheet/Blue Tags
  - Ground Zero Walks
  - Rewards/Recognition
- Infrastructure
- Practices

5S Charter

- Action Plan
- Measures of Performance
- Expected Benefits
- Critical Success Factors
- Expected Risks

Blue Tags

- Self-adhesive labels that can be placed on items
- Denotes that item should be moved/removed
- Blue-tag register used as a central record keeper
  - Could be electronic with AC/Confluence

No. 0001 Date:

Blue Tag – Item Copy

What item should be moved:

How should it be moved:

Why:

Submitter:

Person Responsible:

Blue Tag Register

Version 1.1

Blue tag no.	Date of blue tagging	What	Where	Who is responsible for taking action	Why	When	How	Actual closing date	Remarks

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Implementation Sheet

Similar to Blue Tag Register but for 5S processes instead of items

5S Implementation Sheet

Employee Name: **Date:**

State the problem:

Solution Recommended:

Impact of the solution:

Accepted/Rejected:

Evaluated by:

Rewards

- Nonmonetary
- Publicity or small token
  - Picture on Visual board
  - Key rings, mugs, pens…
- Some possible monthly/quarterly awards:
  - Best Area
  - Most changes suggested

Enablers

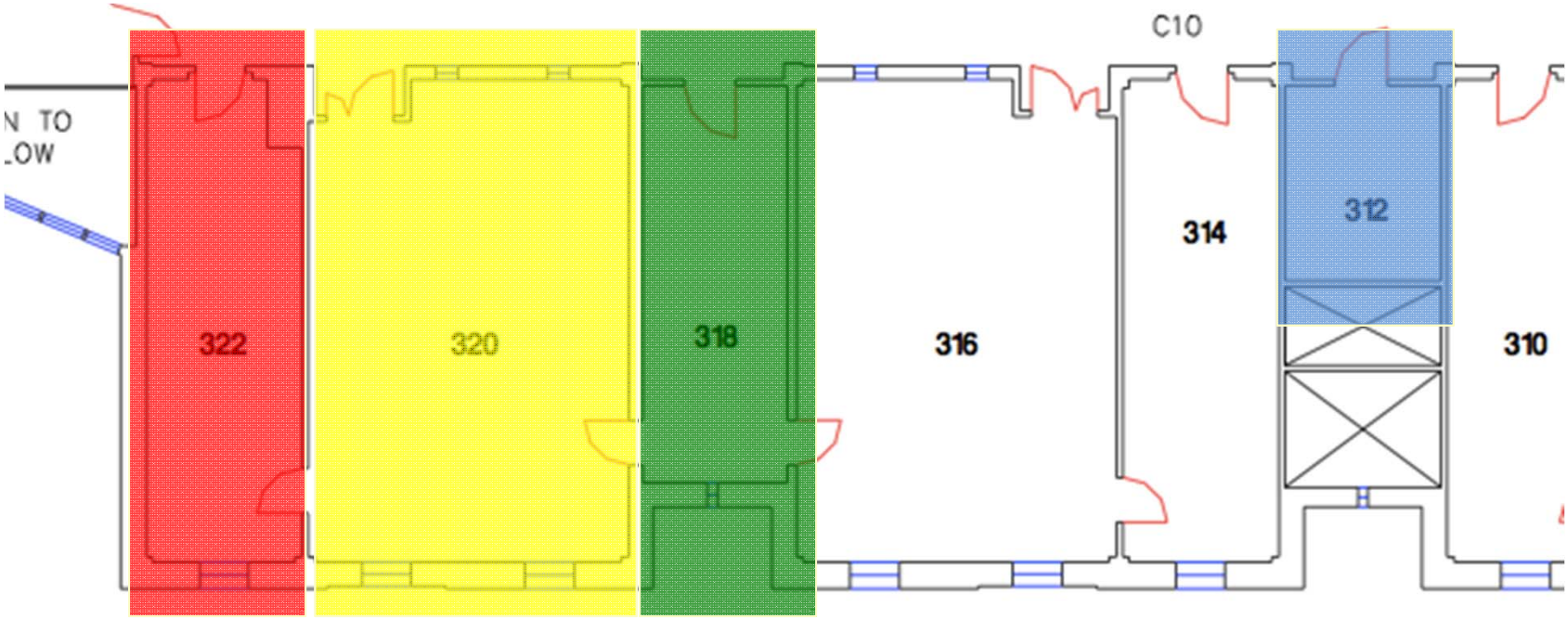
- Structures
- Processes
- Infrastructure
  - Workplace Visual Board
  - Kanban Cards
  - Inventory Management
- Practices

Workplace Visual Board

Show information about & results of 5S

- Before/After photos
- Ownership matrix
- 5S Charter
- Measures of Performance
- Photo of Best 5S
- 5S Audit results

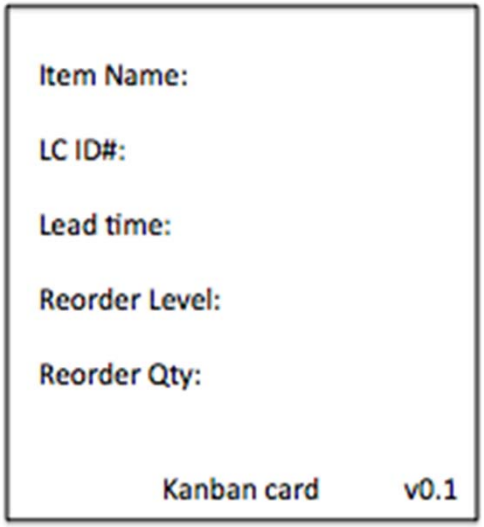
Ownership Matrix



Location	Person Responsible	Backup	Audit Day/Time
312	Dave	Neil	Thurs. 8 AM
318	Chris	Dave	Thurs. 8 AM
320	Neil	Chris	Thurs. 8 AM
322	Dave	Chris	Thurs. 8 AM

Kanban cards

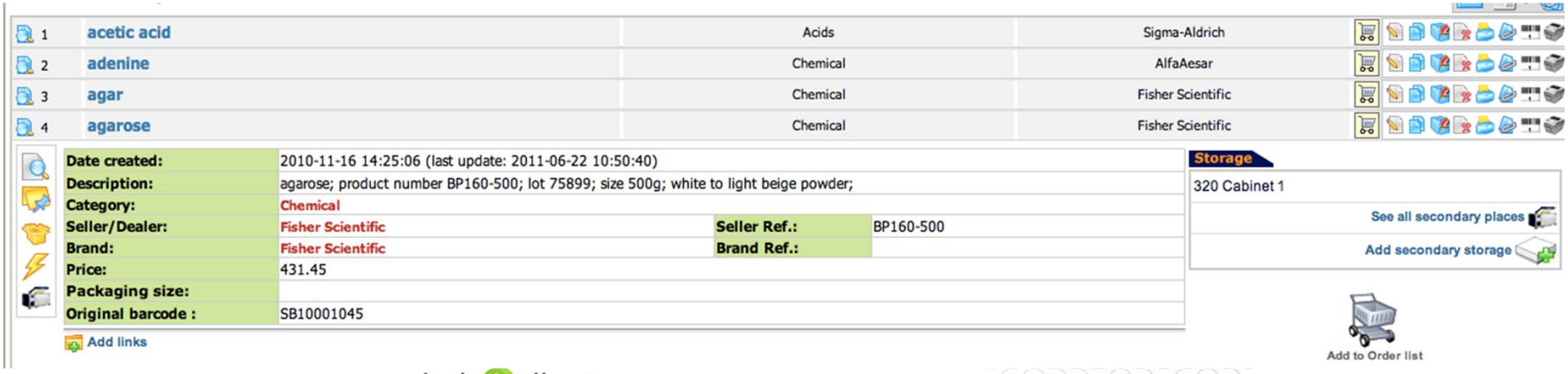
- Clearly display information for items in storage
- Tells when to reorder and how much

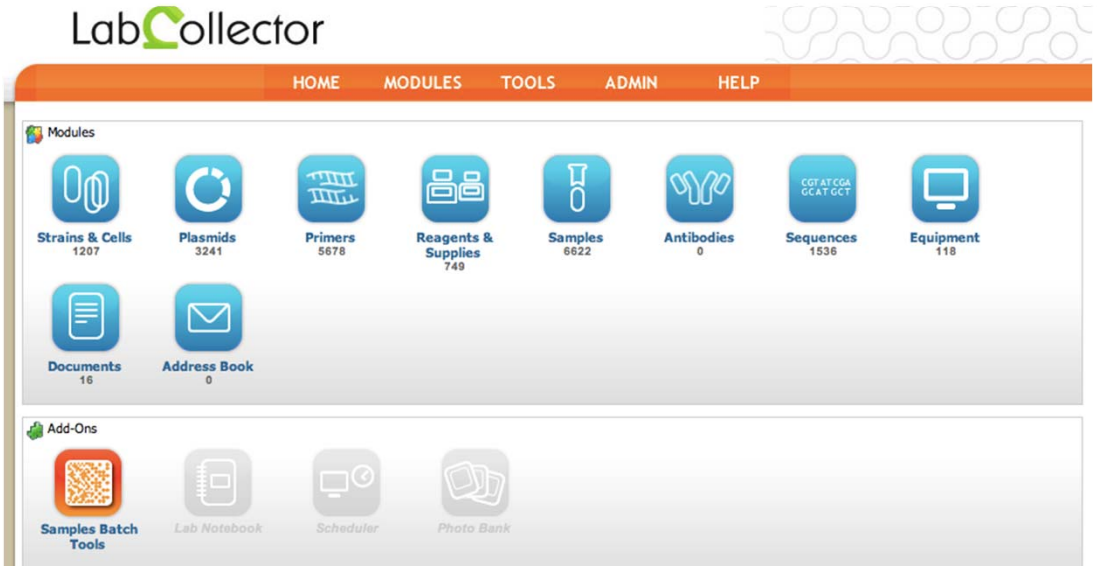


Inventory Management

- Master Index of Supplies (LIMS system)
- Location Indices
  - Chemical cabinets
  - Flammable cabinet
  - Corrosives cabinet
- Calculate re-order levels
  - Use 2-bin system

LabCollector





http://labcollector.com

Enablers

- Structures
- Processes
- Infrastructure
- Practices
  - Daily Checklist
  - Weekly Audit
  - “Ground Zero” Walks
  - Measures of Performance

Daily Checklist

5S Score Sheet

Location: **Reviewer:** **Date:**

Item Description	**5S Evaluation & Scoring Criteria** 0 = 5+ problems 1 = 4 problems 2 = 3 problems 3 = 2 problems 4 = 1 problem 5 = 0 problems	**Score (0-5)**	**Notes for Next Level Improvement** Any score < 5 requires a comment
No Unnecessary Items	All items not necessary for performing work are removed from the workplace; only tools, and products are present at workstations. *No items are on top of machines, cabinets, or equipment*		
Documentation Binders	Binders are returned to shelves		
Material Storage	Boxes, containers, and materials are stored neatly in clearly labeled shelves or cabinets. WIP and other small items are not stored on the floor. Large items are stored on the floor in correctly color-coded areas. Stacked items are not crooked or in danger of falling over		
Tools and supplies	Tools and supplies (pipette tips, tubes, etc.) are stored neatly in designated areas.		
Cleaning Equipment & Materials	All cleaning equipment and materials are easily accessible and stored neatly in a clearly-labeled location		
Emergency Equipment	Fire extinguishers and emergency/first-aid equipment is unobstructed and correctly stored. Eye-washes have been flushed.		
Floors (cleaning)	All floors are clean and free of debris, oil, and dirt.		
Equipment (cleanliness)	Machines and equipment are clean; windows and work surfaces are clean and polished. *No unnecessary items on top of equipment*		
Equipment (maintenance)	All machines and equipment are neatly painted. Safety guards are and signs are correctly installed. No fluid leaks, frayed electrical cords or worn air lines		
Visual Management Systems	SOP documentation is up-to-date, in good condition, easily visible, and neatly displayed in the designated locations		
5S Control (posted)	Weekly audits completed, results graphed, countermeasures implemented		

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Checking Compliance

- Weekly Audits
  - Non-lab personnel formally check for things out of place, using same checklist
- "Ground zero walks"
  - PI informally walks through lab

5S Performance

5S Score Sheet

Location:

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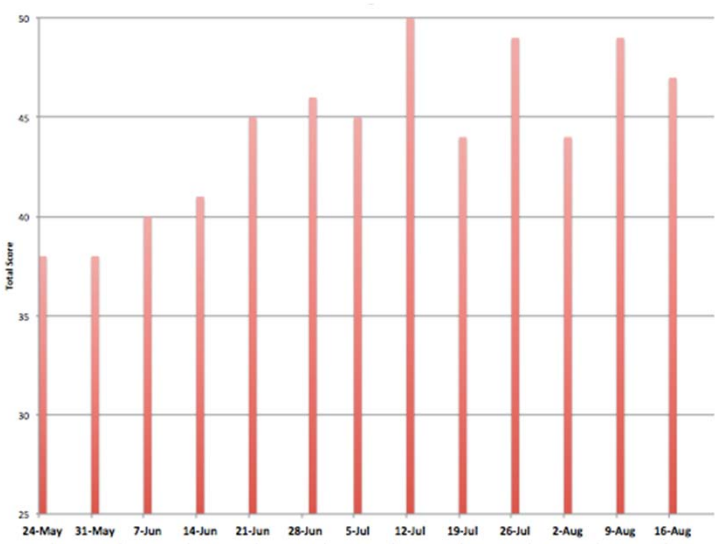
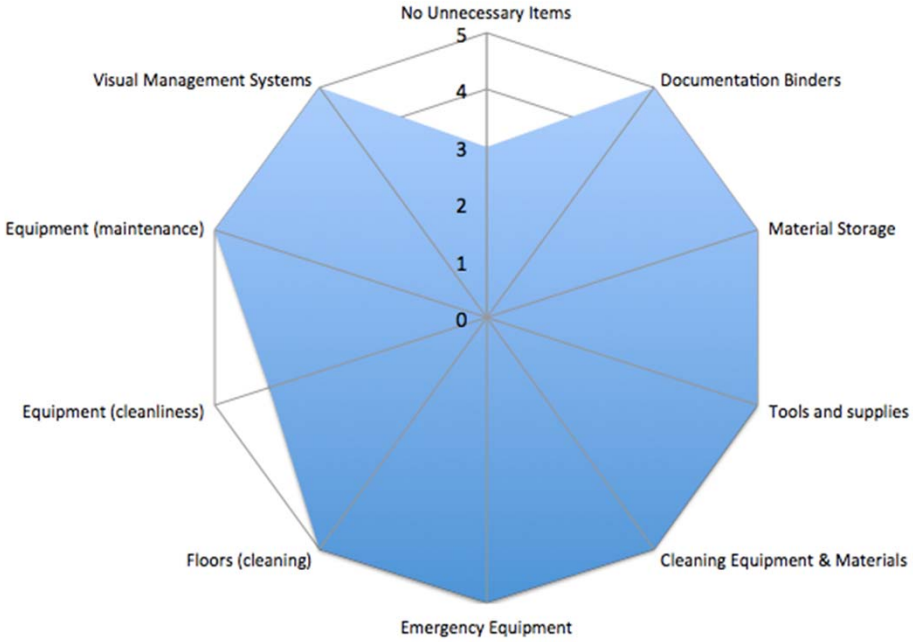




Ground Zero walks

- PI should walk through spaces
- Look for potential problems
- Look beyond obvious (in drawers, corners, etc.)
- Talk to employees
- Relaxed disposition
- Coach, not inspector

Measures of Performance

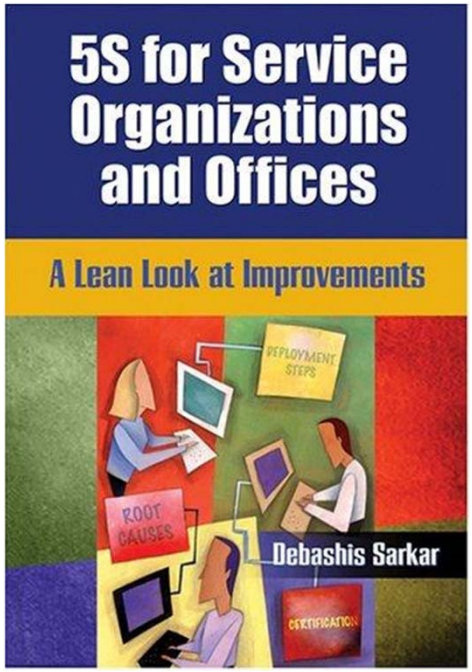
- No more than 3-4
- Keep them simple
- One-time MOPs
  - Sq. footage freed up
  - Cabinet/Shelf space freed up
- Recurring MOPs
  - Productivity improvement
  - Number of Suggestions received
  - Number of Suggestions implemented

Summary

- Much room for improvement in efficiency of academic labs
- 5S as a tool to organize the laboratory
- Sustaining 5S is the most challenging aspect
  - Define MOPs early!
- Requires buy-in from everyone

Acknowledgements

John Hughes
provided us with generous advice to help us embark on our own 5S adventures.



5S for service organizations and offices: a lean look at improvements.

D. Sarkar, ASQ Quality Press 2006

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Acknowledgements

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