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Optimizing Materials Handling on the Cheap

How to Lean Your Workflow
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Infopeople Webinar

- My name is Lori Bowen Ayre. I work often on automated materials handling projects and RFID.
- Sometimes have opportunities to suggest ways to improve materials handling workflow – my suggestions are largely drawn from Lean methodologies
- Hope to share some tips and pique your interest in Lean

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Defining Lean

Lean is a set of concepts, principles, and tools used to create and deliver the most value from the customer's perspective while consuming the fewest resources.

Lean is a Workflow Improvement methodology like…

- Six Sigma
- TQM (Total Quality Management)
- BPR (Business Process Reengineering)

What I like about it:

- **Practical**
- **Customer focused**
- **Empowers staff**

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Value and Value-Add

Lean focuses on effectively delivering *value* to your customer

Value-add activities

- Are activities the customer is willing to pay for
- Transform the product or service
- Must be done correctly the first time

Based on idea of Value to Customer

Any activity that adds value to the customer is a "value add" activity

Per Lean, three criteria define "value add"

- Are activities the customer is willing to "pay" for – "would" pay for?
- Transform the product or service – make a difference to the end product
- Must be done correctly the first time – are not defective or missing something or the wrong thing

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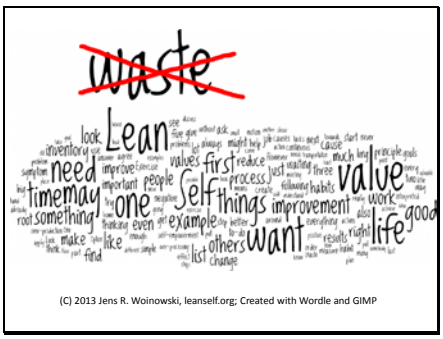

If not value add

- Incidental work –don't necessarily contribute to the end product
- Waste

- Waste is anything other than the minimum amount of equipment, materials, technology, space, and worker's time that are essential to add value to the product, service or information required by the customer.

- Waste is a symptom of underlying problems with the system which need to be corrected.

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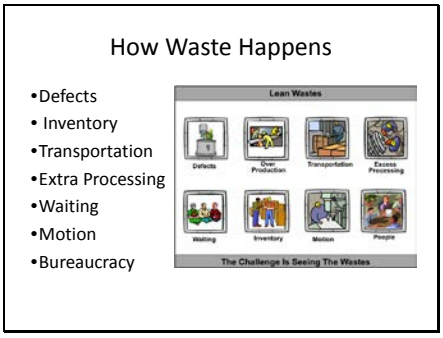

Categories of Waste

- **Defects** – things that have to be fixed or redone (wrong CD in case?)
- **Excessive Inventory** – having more than you need or not the right inventory (too many Harry Potters? Not enough?)
- **Transportation** – moving things from place to place unnecessarily (filling hold requests only to have them expire?)
- **Processing** – adding processing steps that don't do anything for customers (sorting things to carts multiple times, extra stickers on material?)
- **Waiting** – staging material (bookcarts full of books waiting for the right person to arrive so they can be shelved)
- **Motion** – unnecessary handling, hand-offs, and touches (checking every CD and DVD for condition, too many different people involved in a process)
- **Bureaucracy**

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Value Stream

All the activities, materials, people, and information that must flow and come together to provide your customer the value they want, when they want it and how they want it

Value Stream – all the linked activities, information, and people that go into delivering the product or service to the customer

Goal is to eliminate waste in the Value Stream.

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PDCA Improvement Cycle

Process of "leaning your workflow"

- **Plan:** determine goals and needed changes to achieve them
- **Do:** implement the changes
- **Check:** evaluate the results
- **Act:** standardize and stabilize the change or begin the cycle again

Lean's PDCA Improvement Cycle

Plan: determine goals and needed changes to achieve them

Do: implement the changes

Check: evaluate the results

Act: standardize and stabilize the change and/or begin the cycle again

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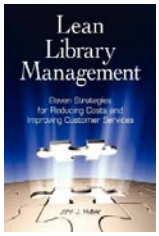
Lean Library Management by John J. Huber

- Excellent resource for applying Lean ideas to library workflows
- Provides step-by-step instructions



Only book applied specifically to library workflows

He doesn't talk about PDCA specifically but has a definite set of steps he recommends.

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Huber Steps to Leaning Your Workflows

1. Form Team
2. Select Value Stream to tackle and set goals
3. Document the process (value stream)
4. Analyze the process to find waste
5. Design new workflow
6. Implement new workflow and analyze results (measure)
7. Continue to make adjustments (continuous improvement)

Huber Steps:
Beyond scope of webinar to go into each step in depth, so will highlight a couple of things….

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Lean is an Organizational Effort

- The people who do the work are the experts – they must be involved
- Management support critical
- Top Down and Bottom Up

This is the empowering staff part that I like about Lean

People who do the work are the experts – they must be involved

- People who really know the workflow and why certain things are done
- Point is to empower and engage everyone at every level

Management support critical too

- Process takes time and Lean Team needs to be released to do the work
- Process results in change – Management needs to support those changes

As Huber says, it's a Top Down and Bottom Up process

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Define Value Stream in Customer Terms

- Not a Value Stream: processing bookdrop
- *Value Stream:* shorten return to shelf time (RTS) for bookdrop returns

Really important to define value stream in customer terms – for example

Why reduce processing time for checking in bookdrop returns - to get library material on the shelf so patrons can find it and to trap holds to get holds filled faster.

To analyze workflows, Lean (and Huber) make use of Value Stream and Process maps

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Use Value Stream and Process Maps

Value Stream Map – high level view
- Designed for leadership (people who can authorize changes)

Process Maps – micro view of each step
- Created by people doing the work
- Includes:
  - Each step of process
  - Person doing the work
  - Equipment used
  - Handoffs
  - All "wait times"

Value Stream Map – high level, for your library director and Board, helps show the big picture and where the issues are – get buy-in

Process Maps – in the trenches, done by people doing the work who know all the steps that are really involved

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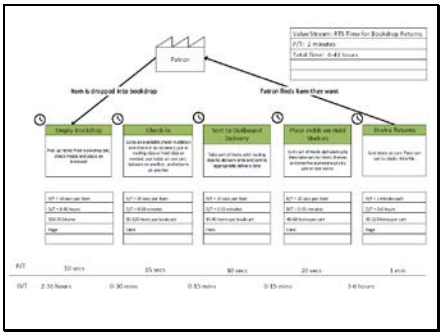

Could do an entire week on Value Stream Maps – but this shows you what a very simple one might look like.

Sample included in handouts

Created with Visio

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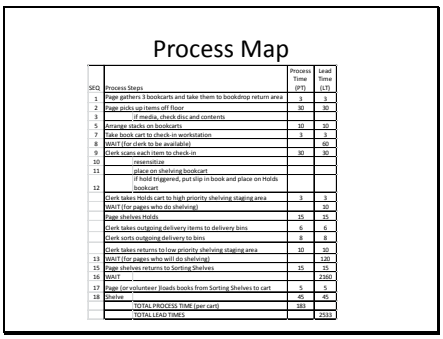

Process Map

SEQ	Process Steps	Process Time (PT)	Lead Time (LT)
1	Page gathers 3 bookcarts and take them to bookdrop return area	3	3
2	Page picks up items off floor	30	30
3	If media, check disc and contents		
5	Arrange stacks on bookcarts	10	10
7	Take book cart to check-in workstation	3	3
8	WAIT (for clerk to be available)		60
9	Clerk scans each item to check-in	30	30
10	reserolize		
11	place on shelving bookcart		
12	if hold triggered, put slip in book and place on Holds bookcart		
	Clerk takes Holds cart to high priority shelving staging area	3	3
	WAIT (for pages who do shelving)		10
	Page shelves Holds	15	15
	Clerk takes outgoing delivery items to delivery bins	6	6
	Clerk sorts outgoing delivery to bins	8	8
	Clerk takes returns to low priority shelving staging area	10	10
13	WAIT (for pages who will do shelving)		120
15	Page shelves returns to Sorting Shelves	15	15
16	WAIT		2160
17	Page (or volunteer)loads books from Sorting Shelves to cart	5	5
18	Shelve	45	45
	TOTAL PROCESS TIME (per cart)	183	
	TOTAL LEAD TIMES		2533

Process map – every step, handoff, wait, motion, transport, etc

Sample in Handouts using Excel

What will be done with these maps is to define the “current state” to help you compare it to the new workflows you work together to create – the “future state”

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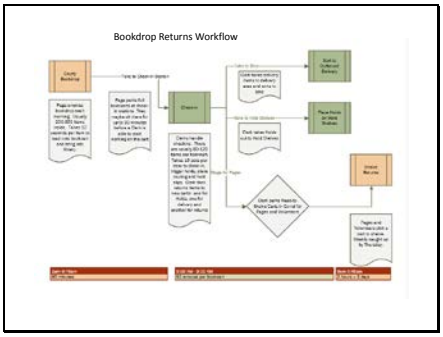

Also using Excel. Flow Chart diagrams. Sometimes work better at showing a process that has lots of twists and turns and options.

The point is to use these tools to have you find the problems.

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ANALYZE THE PROCESS AND FIND THE WASTE

Once you’ve defined the Current State..

With the Team…..

working together pore through the process maps and workflow diagrams and figure out how to simply your workflows

- No blame
- Respect everyone’s contribution

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Critical Questions for the Team

- What equipment changes would make a difference?
- Do we really need all these steps?
- How can we eliminate all delays and make this process flow?
  - adjust work assignments
  - plan around "peak" volumes
  - simplify!

A Lean analysis involves looking for steps

- That can be combined
- That can be divided into smaller steps
- That can be changed in sequence
- That can be moved
- That can be aided with tools or equipment
- Requiring a special skill that can be simplified
- That can be automated

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Find Ways to Eliminate…

- Excessive walking, reaching, or bending
- Wait times and delays
- Errors and defects
- Handoffs between people
- Transfers of material

Eliminate

- Excessive walking, reaching, bending
- Wait times and delays
- Errors and defects
- Handouts between people or from one bookcart to another!

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Implement New Workflow and Begin Monitoring Results

- Not as easy as it sounds
  - may require new equipment
  - may require training
  - will undoubtedly require workspace changes

- Make sure you are doing the measurements that will tell you how you are doing – in terms of value to the customer

Implement! May have to phase in the changes depending on what you want to do

This is where the "top down" support is key. Have to be willing to shake things up, invest in equipment and workspace modifications.

Make sure measurements measure the right thing – keep the focus on the customer, e.g.

- RTS Holds 1 business hour from notices going out
- RTS Returns before opening
- Transit Returns/Holds in Bookdrop – out same day a.m. delivery

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FOCUS ON LABOR EFFICIENCY AND PRODUCTIVITY AFTER THE PROCESS HAS BEEN STREAMLINED, BATCH SIZES REDUCED AND LEAD TIMES REDUCED.
(Huber)

Only after you've removed the waste from your value stream do you focus on labor efficiency/productivity

Sometimes it seems like you are doing things less efficiently when you really focus on the value stream. We'll talk about this a bit more later…

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CONTINUE TO MAKE ADJUSTMENTS

The final step (per Huber and Lean) is to continually make adjustments – remember it was the PDCA Improvement CYCLE

It is an iterative process: some big changes – lots of incremental changes – some big changes – lots of incremental changes

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Continuous Improvement

- An important Lean principle because…
  - Conditions change
  - Always room for improvement
- Everyone should be looking for those improvements every day
- Many Lean tools to support continuous improvement

Concept of "Continuous Improvement" is key to Lean

- Recognizes that change is a fact of life and there's always room for improvement
- Relies on the people doing the work who are now empowered to suggest changes when they see those duplicate steps or delays or problems with the flow
- Lean books are full of ideas for how to continually monitor your environment to find improvements. Let's talk about two biggies…Visual Management and the 5Ss of Efficiency

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Goal: status of system can be understood at a glance for everyone

VISUAL MANAGEMENT

My favorite: Visual Management

Creating an environment where you can see immediately what's amiss, what's going well, what the overall status and state of affairs – think "at a glance"

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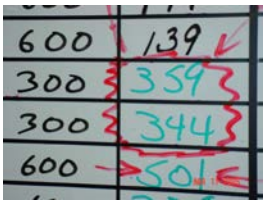
Display Boards Showing Goals and Key Metrics



Display boards are key

- performance trend charts for key metrics
- see trends
- how are you handling the surges
- where are the peaks
- are you hitting your goals?

Some examples…

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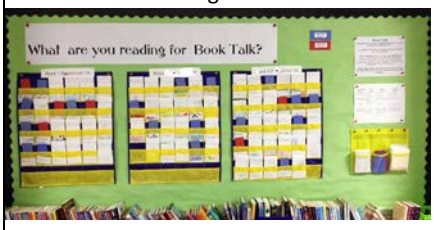
Teachers are Naturals at Visual Management!



From a Lean Elementary School teacher
Blue card – reading a book from home
Red card – reading a library book
White card – reading book owned by teacher

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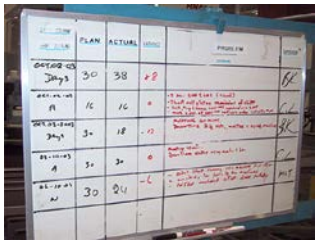
Display Board Reveal Problems to Address



Don't have to be fancy, just show the key info and help you identify problems and the resolution status of those problems

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Labeling Work-in-Progress

In Lean thinking, keeping track of what's done, work in progress, and backlogs is important. If you don't know you have a problem, you can't address it.

Poll 1: Indicate whether your library has shelved all material that was returned last Tuesday YES / NO / Not Sure

Most libraries don't really know. But it is POSSIBLE to know.

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Here's a simple solution from one of my clients.

- Today is PURPLE
- Purple labelled book trucks came in today
- Most in the room were Yellow – yesterday
- A few were Pink - 48 hours olds
- Easy to see when they were in trouble – at a glance

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"Sorting" Shelves are NOT Visual Management

- Don't know how bad backlog is
- Wasted steps of shelving and unshelving

Another client - No Visual Management

- sorting shelves
- no indicator of when they were returned or checked in
- Waste of steps to take to shelves, remove from cart, interfile on sorting shelves
- wait for someone to come by at some unspecified time to select some unspecified batch of books
- sort to booktruck
- take out shelves and interfile again
- Who knows how long some of the books have been there….

Another Lean tool the 5Ss of Efficiency

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LEAN TOOL: FIVE SS OF EFFICIENCY

Sort

Straighten

Scrub

Systemize

Standardize

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#1 Sort

- Retain, Return, Rid
- Only what is needed, in its proper place, clean and ready to use
- When in doubt, move it out

Sort:
RETAIN items essential to work area,
RETURN items belonging elsewhere,
get RID of everything else

"Only what is needed, in its proper place, clean and ready to use

Two examples: one good and one not so good.

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Good

"Only what is needed, in its proper place, clean and ready to use"

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Not so good

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#2 Straighten

- Find a place for every essential item, delineate it and label it
- A place for everything and everything in its place

#2 Straighten: find a place for every essential item and put everything in its place and delineate and label it

Poll 2: If I walked into your backroom, would I know - just by looking - where empty book carts are staged? Where the interlibrary delivery is dropped off? And which carts were checked in and ready to shelve? YES / NO

Two examples: one good and one not so good.

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Good. floor tape can be used to show

- where incoming delivery should be placed where outgoing delivery should be placed where empty book carts go
- where ready to shelve bookcarts go (and in what order)
- where the aisles are

When an area is taped off

- it helps you see when work is caught up
- when you've spilled over because you are backlogged or there's been some kind of surge

This enables you to react quickly to the condition

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Not so good.

- Is this a typical delivery?
- Are some from the previous day? Two days??
- Where's the aisle?

This is from a situation in a library system where they needed to make more frequent deliveries of smaller volumes because there wasn't enough room in the backroom to handle their weekly surges.

Made them even more inefficient because

- couldn't move around
- had to move things around just to get your bookcart to a desk
- workspaces were cramped
- Created more backlog further cramping them and then the next delivery would come and on and on!

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#3 Scrub

- Clean work areas make everyone feel better, are safer, and reveal problems

#3 SCRUB Clean work areas

- make everyone feel better
- are safer
- reveal problems

And it's everyone's problem

See many backrooms that would be much more spacious and pleasant if someone did a spring cleaning - extra stuff was taken away, resulting spaces cleaned up and put to use

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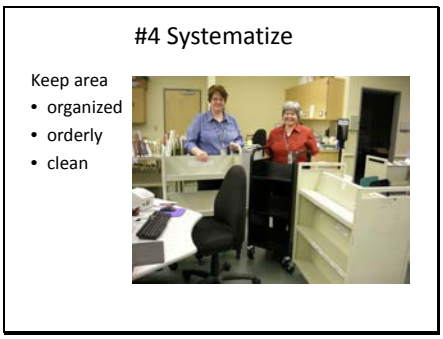

#4 SYSTEMATIZE Establish a way of doing things that everyone agrees upon and get the equipment you need, organize the space, and train people to do it.

This library ALWAYS used three bookcarts for check-in staff.

- small black one was ALWAYS used for Holds
- two sided one for book returns
- other one for Media
- carts always arranged the same way
- all check-in desks organized the same way
- items on carts organized the same way

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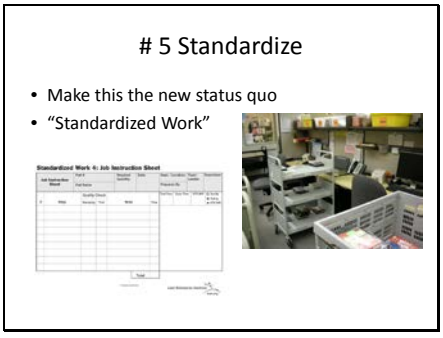

#5 Standardize Lean uses Standardized Works as a concept to describe a set way of doing things (like the previous picture) PLUS the metrics associated with that work.

Pictured on slide is an example of a Job Instruction sheet that would include info about the check-in process (for example):

- each step of check-in
- how long it is expected to take
- record of work performed
- Is it working? What needs changing?

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WHERE LIBRARIES OFTEN GO WRONG

Next, let's focus specifically on libraries and some traditional ways of doing things….there are some practices that are most definitely not "Lean"

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- Bookcarts – great for lots of things including drill team, but not everything
- Batch size is a big deal in Lean thinking. Getting the batch size right can make a big difference in workflow.
- Think about the problem I described earlier at the library who's batch size for incoming delivery was too big….
- Point is…bookcarts should not define the batch size.
- It might be more efficient from a staff productivity point of view to wait for an entire cart of children's books to be full before shelving – but is that the best strategy for the customer?

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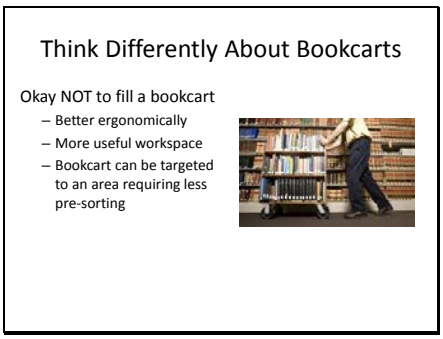

- Full book carts can be very heavy – easy to move around with fewer items on the shelves
- Using just the top and second shelves is better ergonomically – don't have to bend down
- If you limit a book cart to a smaller range of material, it doesn't need to be presorted. Can just take the one cart out to an area and get it on the shelves.

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- Imagine this volunteer trying to move that bookcart - once it was full - up and down the aisles!
- It probably weighs 3x her total weight!

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- Staging areas for book carts and library material has become an accepted way of life in libraries.
- Sorting shelves – grrrrr
- Sorting carts – really necessary?
- Ready to shelve carts – if they are ready to shelve….can't you just shelve them???

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"Staging areas hide inefficiencies and imbalances between workstations and staff, and they are an open admission by management that they have designed into the service flow imbalances and delays“ (Huber)

"Staging areas hide inefficiencies and imbalances between workstations and staff, and they are an open admission by management that they have designed into the service flow imbalances and delays“ (Huber)

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Lack of Acquisitions Master Schedule

Acquisitions and Surges of material

- Money comes in from a donation or grant or materials – must spend!
- Better: Move to a Master Schedule
- Spread out purchases over the year
- Anticipate some of the surges
- Depts have to talk to one another – not okay for Acq to wreak havoc on other depts.
- Why Lean is an organizational endeavor, you do have to talk in order to find the real problem.
- Staging areas are a symptom of another problem and sometimes it can be

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Exceptions and Expedited Workflows

- Expedited Workflows (holds, media)
- Volunteers who choose material they want to shelve instead of what needs to be shelved
- Staff unwilling to pitch in to help when needed
- Very difficult to design a workflow with lots of exceptions

- Libraries get stuck on the exceptions. Entire workflows can be created around a single problem patron.
- Develop a workflow that does what you need for most customers – rather than defining workflow AROUND exceptions
- Example. Shelve holds that come in via delivery immediately.
- Meanwhile - all those returns wait
- Better: Find a way to get all incoming delivery out on the shelves in an acceptable time frame.
- Like sorting to sorting shelves, exceptions end up costing you more time. It's all about the flow. Exceptions take you out of the flow.

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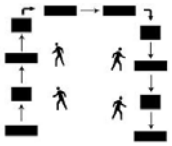
Make a Single Workflow

- You should be able to stand in the middle of a process and see where everything is and how everything is doing (U-shape)



- Make it flow in a U shape. Otherwise you have people tripping over each other and that wastes time too.
- This applies to technical services, to interlibrary delivery, to processing bookdrop.
- Can you stand in the middle of your backroom or TS and know how things are going?

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Rigid Staff Roles

- Surges are a way of life (delivery, holidays, new acquisitions)
- Implement flexible job descriptions
- Cross train staff so they can be more flexible about handling surges
- Seeing the bottlenecks and clogs in the flow isn't useful if you can't put resources to the task of unclogging

Big problem in libraries is the rigid adherence to roles. Clerks do this. Pages do that. And only librarians can do this other stuff.

To Lean your workflow, you have to build flexibility into work classifications.

Another good quote from Huber…

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"If the current organizational structure cannot change, then the processes behind this organizational structure cannot change either" (Huber)

"If the current organizational structure cannot change, then the processes behind this organizational structure cannot change either" (Huber)

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San Jose Lessons Learned

- Don't need staging areas for sorting
- Sort only to top shelves of book carts
- Two return slots are better than four

San José Public Library

In the 2012 California Library Conference, Carol Frost and Ruth Barefoot, Trish Sylvie and Kelly Hubbard gave a great presentation on two Lean initiatives they undertook. On project focused on returns:

- There PPT is attached in the handouts.
- But here's what they found out in their process.
- They actually did not need any staging areas for sorting
- Sorted only to the top shelves of book carts (used two shelve carts)
- Reduced their bookdrop return slots from 4 to 2 – Media and Books.

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San Jose's Lean Project

- Time for returned materials back to shelf went from 23 hours to 15 hours
- 20% reduction in labor costs
- Improved employee productivity and morale
- Improved space utilization
- Staff re-assigned to relational work

What they accomplished

- Time for returned materials back to shelf went from 23 hours to 15 hours
- 20% reduction in labor costs
- Improved employee productivity and morale
- Improved space utilization
- Staff re-assigned to relational work

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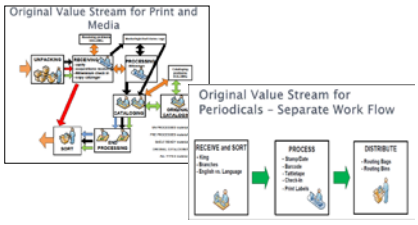
San Jose's 2nd Lean Project



2nd project was to look at Technical services.

Here's their workflow diagrams showing their "current state"

- They had two separate workflows.
- One for Periodicals
- Another for Print and Media.

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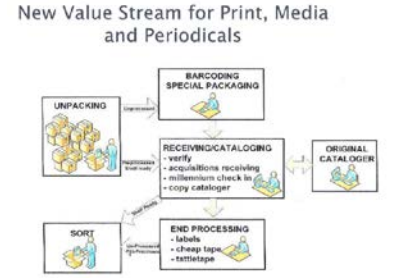

Were able to consolidate and simplify this workflow into one nice flow by applying some of the principles I've described (and others).

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Getting Started with Lean

- Huber, John J. (2011) Lean Library Management: Eleven Strategies for Reducing Costs and Improving Customer Services, Neal-Schuman Publishers, New York.
- Review SJPL Presentation (CLA 2012)
- Free webinars from Lean office consultant Karen Martin: http://www.ksmartin.com/webinars/

I hope you've picked up some useful tips

And that I've piqued your interest in Lean

Here's some good resources for learning more:

- Huber book
- SJPL Presentation
- Free webinars from Karen Martin – Lean office consultant