Pre-Planning Secrets: Assess the Potential of Analyzers and Automation to Support Lean Workflow

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November 19, 2009

Session Objectives

- **Discover the 5 top issues faced by laboratory managers in over 40 mid to large sized facilities .**
- **Explore how Lean can be used as part of the decision making process for new equipment.**
- **Learn how changes in Takt Rates can affect each step in the process.**
- **Learn how simulators of your actual workload can accurately project outcomes.**

Agenda

- Summary of issues facing laboratories today
- Pre-Planning Process
  - Understand the Current Situation
  - Perform Lean Lab Process Analysis On-Site
    - Process Map
    - Spaghetti Diagram
    - Lean Process Measures
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    - Current versus revised
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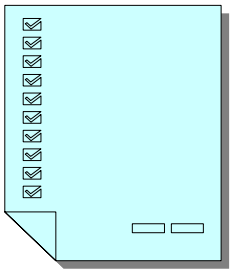
- Pre and Post Lean Example

Typical Considerations with Equipment Evaluations

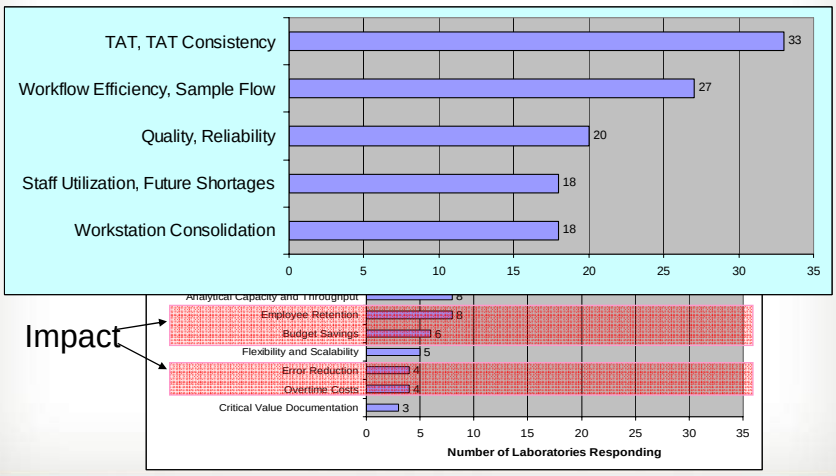
- Most are in the equipment and reagent spec sheets:
  - Throughput
  - Menu
  - Capacity
  - Assay Time
  - Assay Linearity



What They Really Want

- Laboratory Manager
  - "The ultimate goal is to get the most work done for the lowest cost while improving quality and turnaround time."
- Physician
  - "When I order a lab test, my expectation is that it is accurate and timely."

Summary of 42 Laboratory Process Analysis Projects



Top 5 for Medium and Large Sized Laboratories

Medium (1 – 3 mil tests/yr)

1. TAT, TAT Consistency
2. Workflow Efficiency, Flow
3. Staff Utilization, Shortages
4. Quality, Reliability
5. Service, Support

8 out of 30 already automated
5 others plan to automate
43%

Large (3 – 10 mil tests/yr)

1. TAT, TAT Consistency
2. Workflow Efficiency, Flow
3. Accommodate Growth
4. Capacity and Throughput
5. Employee Retention

6 out of 12 already automated
4 others plan to automate
83%

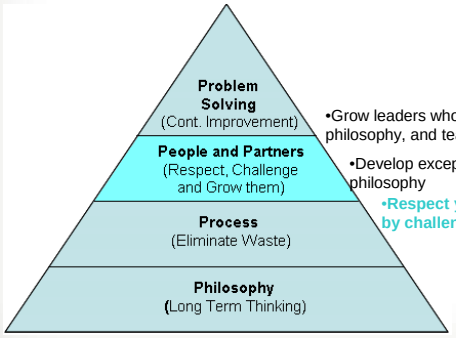
Focus on TAT and Workflow Efficiency

Lean Principles help define the path:

1. **Voice of Customer** (TAT and Quality)
2. **Map the Process** (sample receipt to result)
3. **Spaghetti diagram of sample flow** (movement becomes clear)
4. **Value Stream Map** (important to identify TAT issues)
5. **Takt Rate** (determine the expected rate)
6. Now….see what the vendor offers to Lean it out

The Toyota Way

- Add Value to the Organization by Developing Your People and Partners



•Grow leaders who thoroughly understand the work, live the philosophy, and teach it to others

•Develop exceptional people and teams who follow your company's philosophy

•Respect your extended network of partners and suppliers by challenging them and helping them improve

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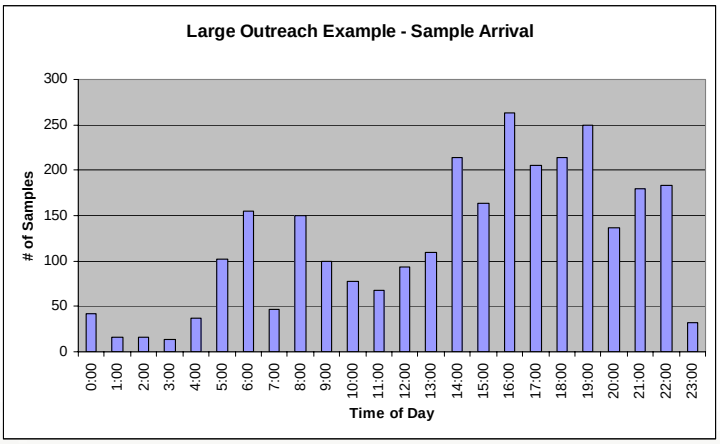
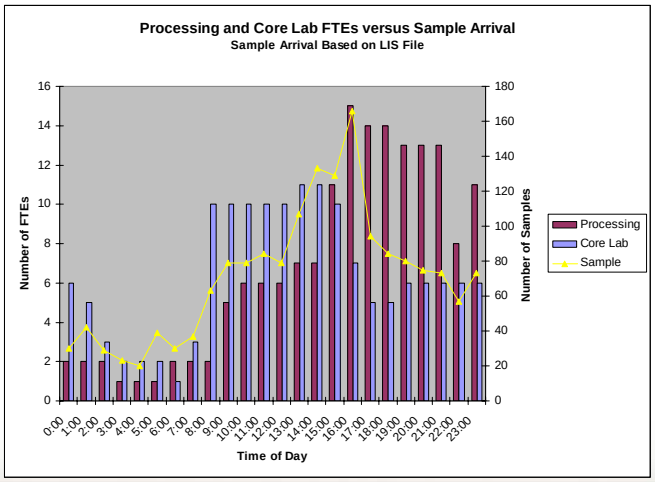
Secret #1:
Understand Sample Arrival Patterns

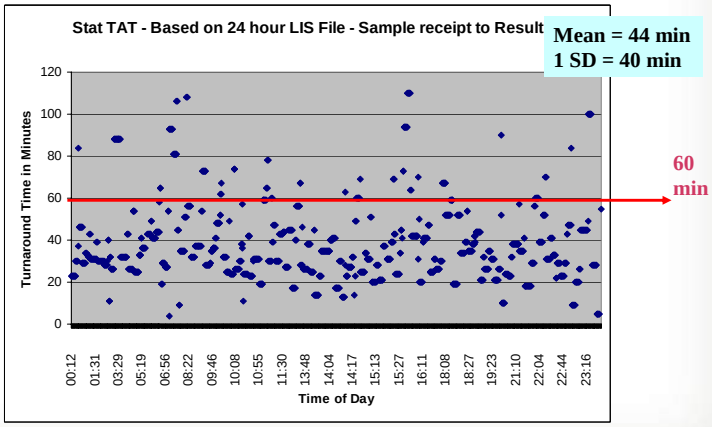


How Does Sample Arrival Compare to Staffing?



Evaluation of Current TAT

Secret #2: TAT Variation – A Closer Look



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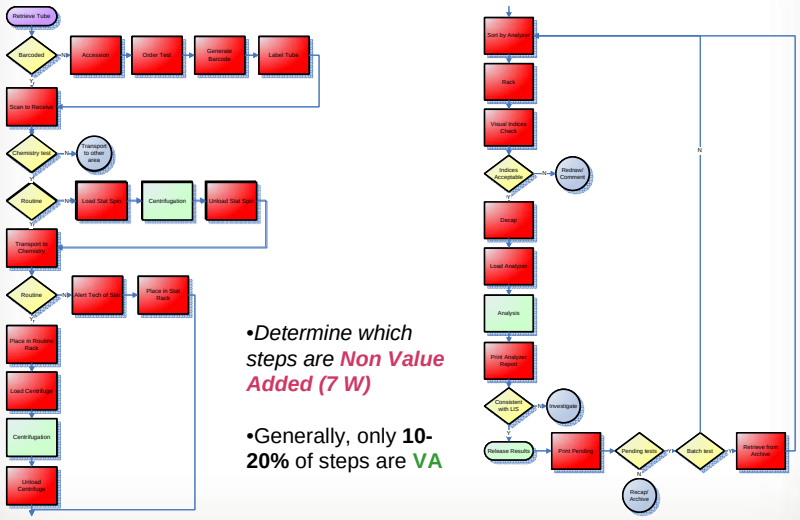
Secret #3

Evaluate Equipment Options Using Data Files

- Process Consultants consider LIS File, Re-Run data, and Cycle data along with on-site observations to:
  - Map out the current process
  - Determine desired future process
  - Determine the impact of the changes
  - Calculate metrics to ensure that the revised state supports the customer's objectives

Process Map – Current Situation



- *Determine which steps are **Non Value Added (7 W)***
- Generally, only **10-20%** of steps are **VA**

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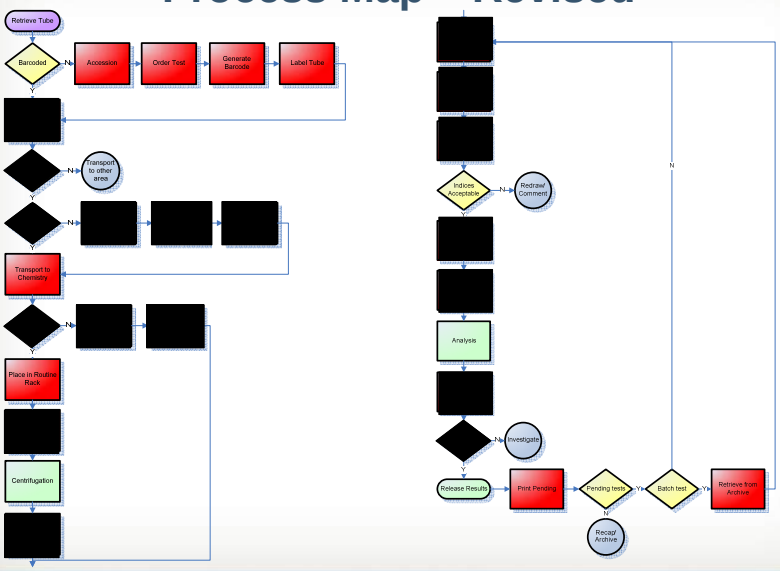
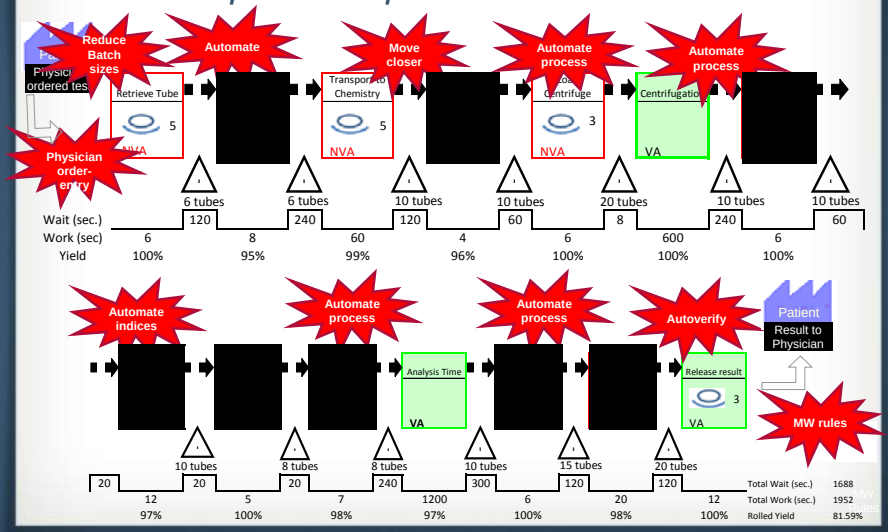
Process Map – Revised



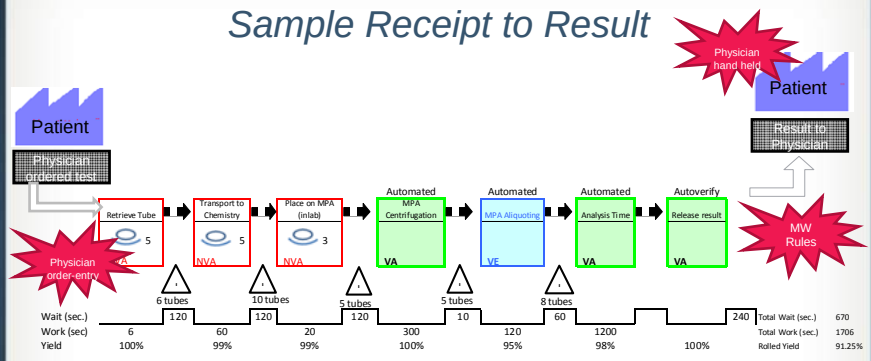
Current to Revised VSM

Sample Receipt to Result



Revised VSM

Sample Receipt to Result



Non Value Added – Total of **8** NVA Steps <u>eliminated</u> (from 11 to 3)

<u>73% Reduction</u> in Non Value Added Steps

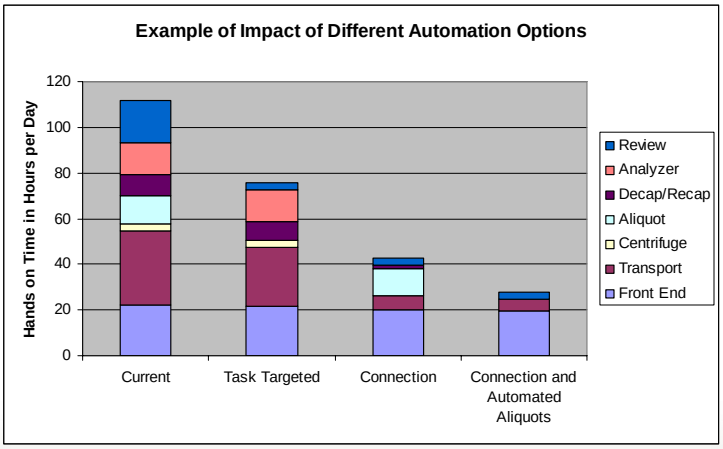
Project Impact: Value Stream Mapping

Process Name:	Sample Testing and Resulting Process		
	REVISED VSM	CURRENT VSM	DIFFERENCE
Work Time (min.):	28.43	32.53	-4.10
Wait Time (min.)	11.17	28.13	-16.97
Total Lead Time:	**39.60**	**60.67**	**-21.07**
% Work Time/Lead Time	71.80%	53.63%	18.17%
Takt Time (50 samples/hr):	1 min. 12 sec./sample	1 min. 12 sec./sample	N/A
Final Yield (Y_f)	99.00%	99.00%	0.00%
Rolled Throughput Yield (Y_{RT})	91.25%	81.59%	9.66%

***Most Significant Time Saving Steps*:**

- Automated Centrifugation
- Automated Clot Detection, Indices
- Automated Decapping
- Reduced NVA Steps

Secret #4:
Evaluate the Impact of All Options



Takt Rate

- The maximum rate that the customer will be pulling product
- Every step in the process must be capable of handling the max flow rate without getting bogged down
- Example:
  - Maximum Takt Rate = 300 samples/hr
  - Takt Time = 12 seconds/sample

Secret #5:
Consider Takt Rate of the Entire Process

- Takt Time
  - How many samples/minute arrive?
  - How many FTEs are needed to process the load?
  - What capacity is required for FTEs, automation and analytics?

Every Step, whether manual or automated, needs to handle the load

Project Impact of Changes in Takt Rate

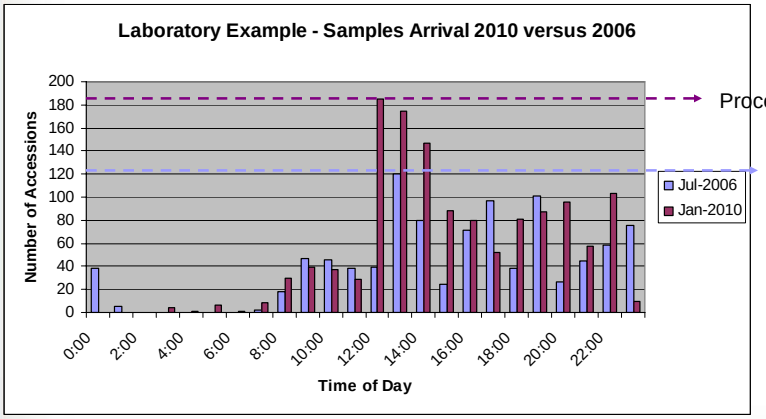
	Retrieve, receive, load centrifuge	Centrifuge	Unload Centrifuge	Decap, Load Rack	Load Analyzer	Analysis Time	Unload Analyzer, Recap	Visual Indices	Review Results	Release result
Takt Rate/hr	300	300	300	300	300	300	300	300	300	300
Max Takt Rate/Step	90	120	500	300	240	100	300	300	180	300
# needed per step	3	3	1	1	1	3	1	1	2	1
	FTEs	Centrifuges	FTEs	FTEs	FTEs	Analyzers	FTEs	FTEs	FTEs	FTEs

25% increase in volume / Takt Rate

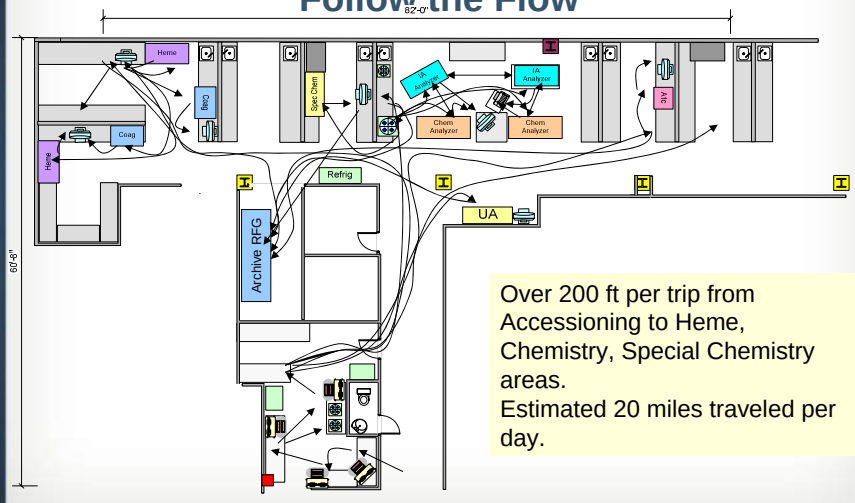
	Retrieve Tube to Load Centrifuge	Centrifuges	Decap	Rerack, Load Analyzer	Rerack, Load Analyzer	Analysis Time	Unload Analyzer, Recap	Visual Indices	Review Results	Release result
Takt Rate/hr	375	375	375	375	375	375	375	375	375	375
Max Takt Rate/Step	90	120	500	300	240	100	300	300	180	300
# needed per step	4	3	1	1	2	4	1	1	2	1
	FTEs	Centrifuges	FTEs	FTEs	FTEs	Analyzers	FTEs	FTEs	FTEs	FTEs
Need Extra:	1	1	0	0	0	1	0	0	0	0

- Takt Rate increases can affect the process
- Downtime (MTBF) must be considered

Example of Workload Changes

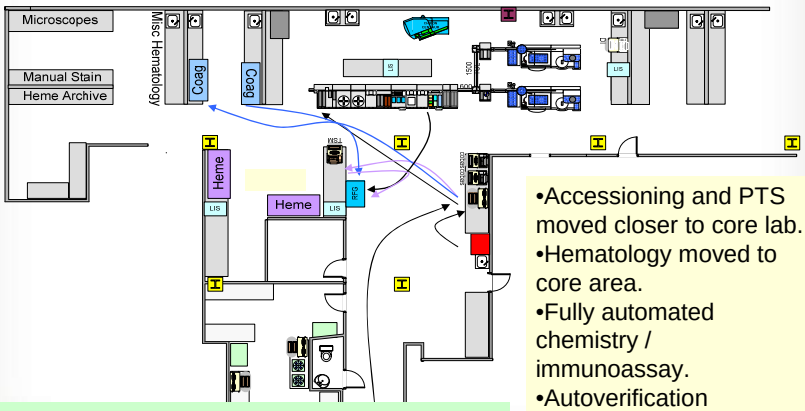


Secret #6:
Follow the Flow



Over 200 ft per trip from Accessioning to Heme, Chemistry, Special Chemistry areas.
Estimated 20 miles traveled per day.

Revised Floor Plan



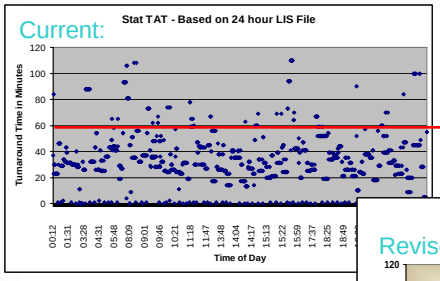
Distance traveled reduced by 70%

- Accessioning and PTS moved closer to core lab.
- Hematology moved to core area.
- Fully automated chemistry / immunoassay.
- Autoverification implemented.

Secret #7:

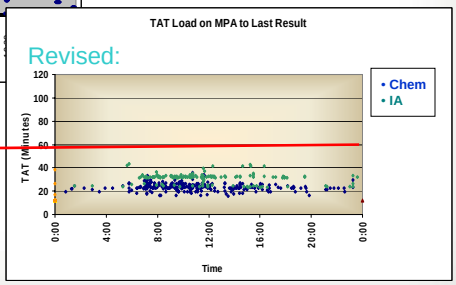
Compare Current and Revised TAT

Current:



Ave = 35 min
SD = 42

Revised:



Ave = 27 min
SD = 5

Improved TAT and variation

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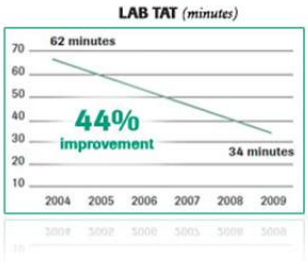
Example #1 – Focus on ISO-15189

Going LEAN – How to Become an ISO-15189™ Certified Lab

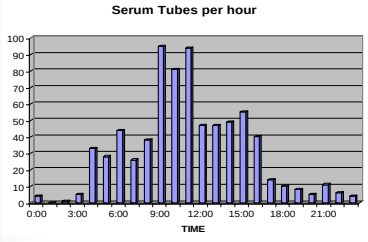


- Turnaround times were reduced by 44%
- Testing accuracy soared to 99.9975%
- A new physical lab layout helped **reduce the lab "footprint" by 1,000-square feet**, streamlining operations and **saving nearly $1-million in capital costs**

Example #2 – Focus on TAT to ED

Challenge: Decrease TAT, improve satisfaction

- Simulation: Automated Receipt to Result < 40 min.



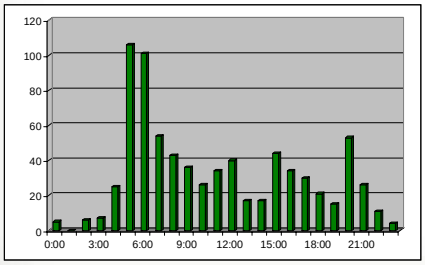
Result:

- Average ED TAT reduced to 28-35 minutes
- Increased physician, patient satisfaction
- Metrics show a more efficient and productive lab environment
  - Predictable TAT
  - Consistent Results

Example #3 – Focus on LOS

Challenge: Report morning run by 0700

- Simulation: Automated Receipt to Result < 35 min.



Result:

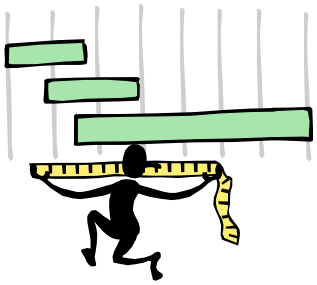
- Reached benchmark goal of 85% BMETs reported by 0700
- Metrics show a more efficient and productive lab environment
- Increased quality of patient care with faster TAT of results

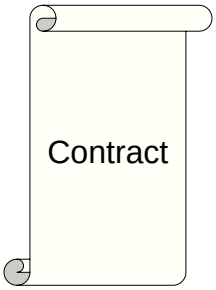
Pre-Planning Secrets: Summary

1. Understand sample arrival patterns
2. Take a closer look at TAT variation against the target
3. Evaluate equipment options using data files
4. Project potential impact of all options using Value Stream Mapping
5. Consider Takt Rate of the entire process
6. Follow the sample flow, current and revised
7. Compare current and revised TAT to project outcomes

Final Pre-Planning Secret:
In a Few Words…

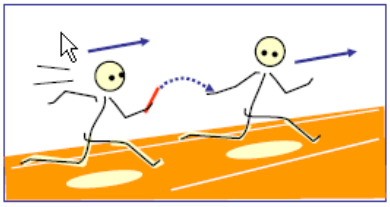
- Measure Twice
- Cut Once





Passing the Baton

- *"Think of team work … like a track relay – there is an area within which the baton may be passed. If the baton is passed well, the final result can be better than the individual times of the runners.*



From *Toyota Production System*, Taiichi Ohno

Passing the Baton

- *The equipment relay race doesn't need to start at implementation.*
- *Using Lean principles in the Pre-Planning phase, with your vendor as part of the team, will help you project outcomes to help you win the race.*

From Lean Enterprise Institute

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