Six Months Later: Measuring Success AFTER Your Lean/Six Sigma Work Flow Redesign to Achieve Further Gains

Allen A. Wozniak, Sr.

Senior Laboratory Solutions Consultant

Presentation Objectives

- Goals of a Lean/Six Sigma Lab
- Data Collection Pre vs. Post
- Analyzing the Data
- Actions
- Summary and Questions

LEAN in the Lab Operation Model

- **Goals**
  - Meet or exceed customer demands of quality test results by the most efficient, cost effective means possible
    - *i.e. the elimination of waste, standardized work, zero defects, on-piece flow*
  - Reduce human effort and interaction
  - Utilize less inventory
  - Take less time to produce test results
  - Use less space

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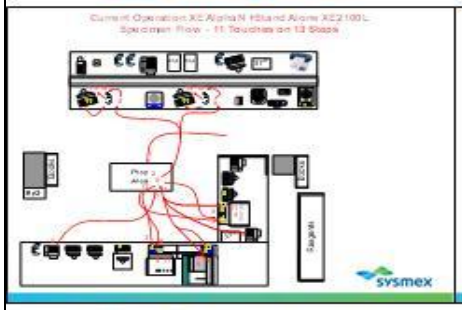
LEAN in the Lab Operation Model
(continued)

- **Basic Principles of a Lean Laboratory**:
  - All specimens analyzed as STAT – no waiting time
  - Inventory of supplies kept to minimum - near zero
  - Scheduling – to meet service level demands vs. coverage
  - Reduce or eliminate batch testing to flow testing (cut batch sizes)
  - Balance of testing to distribute over time and instruments
  - Decrease process times

Pre vs. Post Data

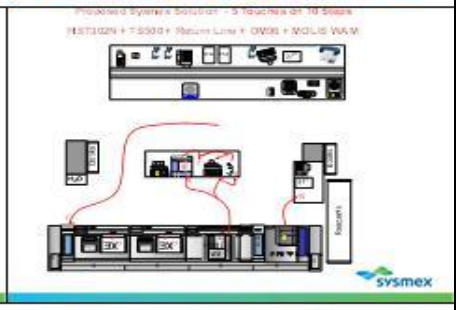
Floor Plan Comparison

Current Floor Plan



Current = 3.5 Required FTE Peak Day

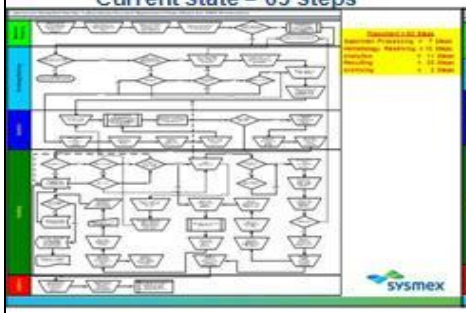
Sysmex Proposed Floor Plan



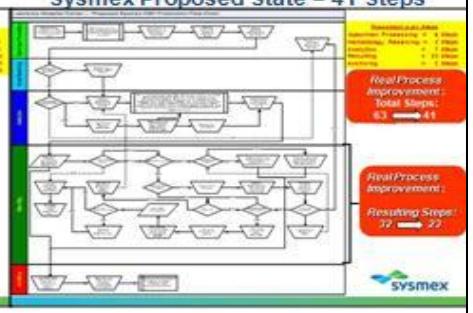
Sysmex Proposed = 1.8 Required FTE Peak Day

Work Flow Comparison

Current State = 63 Steps



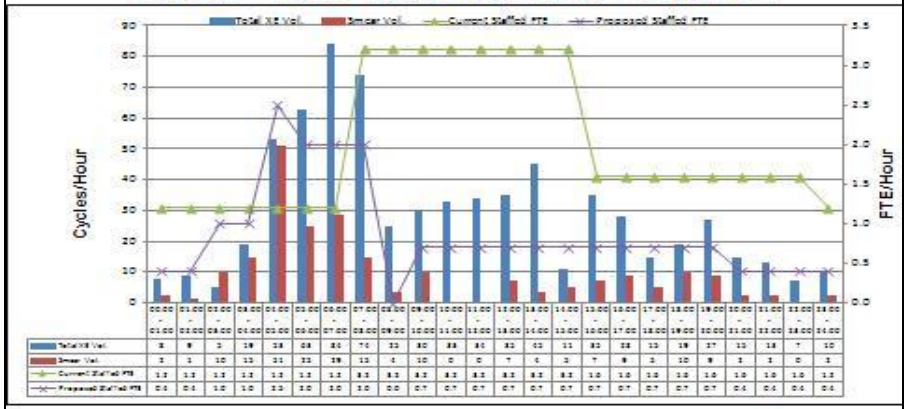
Sysmex Proposed State = 41 Steps



Current Staffing vs. Proposed Solution Staffing

Cycles vs. Staffing

HST302N + TS500 + Return Line + DM96 + MOLIS WAM



	Total XE Vol.	Smear Vol.	Current Staff	Proposed Staff
Tuesday 5/12/2009	697	225	6.0	2.6

Current - CBC TAT - Pre vs. Post

TAT	STAT (min)	Routine (min)	% Change
Goal	≤ 30	≤ 45	
Jan-10	21	43	51%
May-10	13	29	55%

Basic Data Points

- **Testing Volumes – Changes vs. Status Quo**
  - Annual billed volume
  - Total testing cycles
  - Volumes by day of the week
  - Peak day volumes by hour of the day
- **Staffing – Specific for Production of Billed Test**
  - Capture by hour of the day
  - Include weekend staffing
  - Minimum required staff vs. staffed positions
- **Turn Around Times**
  - Goals
  - STAT
  - Routine

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Analyze the Data

- **Testing Volumes**
  - Did the claims meet the stated goals?
  - Changes in test mix
  - Billed vs. non-billed activity
  - Is an increase in non-billed testing activity good?
  - Has there been a change in patient acuity?

Analyze the Data

- **Staffing vs. Productivity**
  - Did the claims meet the stated goals?
  - Map staffing vs. testing volumes by hour
  - Has the gap been closed for staffed vs. required positions?
  - Management vs. Staff vs. Manufacturer
  - Was the goal attainable?
  - Staffing mix

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Analyze the Data

- **Turn Around Times**
  - This is the measure for your laboratory's customers.
  - Has the process map changed?
  - If not improved, what is the cause?
  - Use process map with times.

- **Cost of Production**
  - Did the claims meet the stated goals?
  - Labor vs. production expenses
  - Is there a ROI?

Reactions to Data: *Ask "Why?" 5 Times*

- **Testing Volumes**
  - Expected changes – no action necessary for now
  - Changes in test mix and billed vs. non-billed activity
    - Did this decrease productivity?
    - Did this increase TAT?
- **Staffing vs. Productivity**
  - Expected changes – no action necessary for now
  - Management vs. staff?
  - Manufacturer training vs. end user success
  - Manufacturer help

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Reactions to Data: *Ask "Why?" 5 Times*

- **Turn Around Times**
  - Meeting or exceeding require no changes for now
  - If increased, use process map with times.
  - Is labor being used effectively?
- **Cost of Production**
  - Meeting or exceeding require no changes for now.
  - Production costs should be proportional to billed volumes:
    - Lower cost is good; higher than expected needs evaluation
    - Higher labor costs need to be assessed
      - Staff management
      - Process Management
      - More hands on time required? Why?

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Successful Reassessment - Hospital

Hospital
2010 vs. 2011 vs. Predicted Outcomes

	Avg Billed / Day	Peak Day	Process Steps	Motion Steps	Auto-validation
April 10	287	306	63	12	0%
Estimated	N/A	400	42	8	70%
April 11	328	394	42	8	75%

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Hospital
2010 vs. 2011 vs. Predicted Outcomes

	Routine (min)	STAT (min)	Slide Review	Rerun	CBC FTE
April 10	50	60	40%	5.0%	6.6
Estimated	30	15	25%	3.5%	4.6
April 11	28	8	18%	3.0%	4.6

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Health Network

2010 vs. 2011 vs. Predicted Outcomes

CBC Production 2009 Pre vs. 2011 Post Data

Lab #1 M-F	Ave Billed/Day	Slide Review	% Review	% Rerun	FTE	% STAT
Pre 8-01-2009	843	362	43%	5%	9.0	N/A
Post 8-09-10	882	332	38%	17%	9.9	60-65%
Post 08-02-11	775	219	28%	7.6%	6.5	27.8
Proposed FTE					6.5	

Lab #2 M-F	Ave Billed/Day	Slide Review	% Review	% Rerun	FTE	% STAT
Pre 8-01-2009	472	189	40%	5%	4.0	N/A
Post 8-09-10	414	68	16%	19%	3.7	25%
Post 08-02-11	261	55	21%	6%	3.5	40%
Proposed FTE					3.0	

Lab #3 M-F	Ave Billed/Day	Slide Review	% Review	% Rerun	FTE	% STAT
Pre 8-01-2009	240	84	35%	5%	5.0	N/A
Post 8-09-10	219	66	30%	26%	3.0	25%
Post 08-02-11	242	32	13%	3%	3.0	41%
Proposed FTE					3.5	

Lab #4 M-F	Ave Billed/Day	Slide Review	% Review	% Rerun	FTE	% STAT
Pre 8-01-2009	155	78	50%	10%	3.5	N/A
Post 8-09-10	136	40	29%	13%	2.1	25%
Post 08-02-11	144	32	22%	6%	2.1	38%
Proposed FTE					3.5	

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CBC Production TAT: 2010 Pre vs. 2011 Post Data

Lab#1 TAT	GOAL (min)	% Achieved	60-65% STAT
ED	30	95%	
STAT	45	100%	
Routine	120	100%	
Peds	In by 5AM out by 8AM	100%	
NIC	In by 6AM out by 9AM	100%	

Lab#2 TAT	GOAL (min)	% Achieved	25% STAT
ED	30	95%	
STAT	30	100%	
Routine	120	>95%	

Lab#3 TAT	GOAL (min)	% Achieved	25% STAT
ED	30	95%	
STAT	45	95%	
Routine	120	~100%	

Lab#4 TAT	GOAL (min)	% Achieved	25% STAT
STAT	30	100% (20-30 min)	
Routine	120	100%	

Meeting Goals

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Reassessment of Lab

CBC Production Cycles: May 2010 vs. June 2011

Cycles/Day	Thursday	Friday	Saturday	Sunday	Monday	Tuesday	Wednesday	Ave/Day	M-F Ave/Day	Annualized	Ave/Month
XE's 2010	839	842	623	578	876	914	839	787	862	287,359	23,947
XE's 2011	916	909	708	662	878	926	849	835	896	304,931	25,411
SP 2010	100	93	114	54	98	102	85	92	96	33,684	2,807
SP 2011	154	154	121	84	140	156	142	136	149	49,588	4,132
2011 Slide Box	123	89	93	111	124	177	102	117	123	42,653	3,554
% XE Change	9%	8%	14%	15%	0%	1%	1%	6%	4%	6%	6%
% SP Change	54%	66%	6%	56%	43%	53%	67%	47%	56%	47%	47%
% Slide Review Change	41%	53%	-7%	36%	43%	51%	65%	39%	50%	39%	39%

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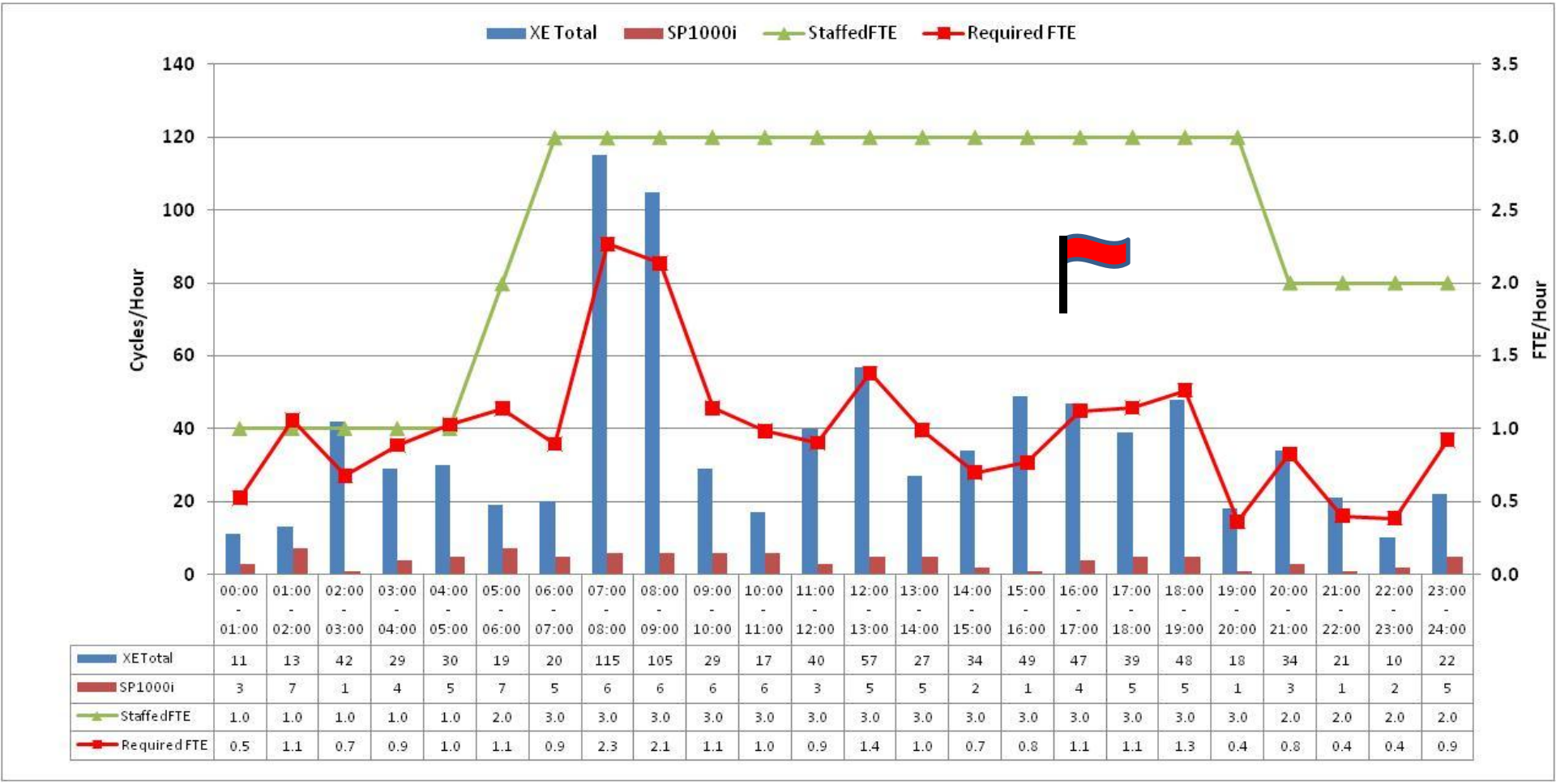
CBC Production: Cycles vs. Staffing



	00:00 - 01:00	01:00 - 02:00	02:00 - 03:00	03:00 - 04:00	04:00 - 05:00	05:00 - 06:00	06:00 - 07:00	07:00 - 08:00	08:00 - 09:00	09:00 - 10:00	10:00 - 11:00	11:00 - 12:00	12:00 - 13:00	13:00 - 14:00	14:00 - 15:00	15:00 - 16:00	16:00 - 17:00	17:00 - 18:00	18:00 - 19:00	19:00 - 20:00	20:00 - 21:00	21:00 - 22:00	22:00 - 23:00	23:00 - 24:00
XE Total	11	13	42	29	30	19	20	115	105	29	17	40	57	27	34	49	47	39	48	18	34	21	10	22
SP1000i	3	7	1	4	5	7	5	6	6	6	6	3	5	5	2	1	4	5	5	1	3	1	2	5
StaffedFTE	1.0	1.0	1.0	1.0	1.0	2.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0	2.0	2.0	2.0	2.0
Required FTE	0.5	1.1	0.7	0.9	1.0	1.1	0.9	2.3	2.1	1.1	1.0	0.9	1.4	1.0	0.7	0.8	1.1	1.1	1.3	0.4	0.8	0.4	0.4	0.9

Operating Parameters: 5/10/2010 vs. 6/8/2011

Category	Monday 5/10/2010	Wednesday 6/8/2011	% Change from 2010
Total Cycles	876	849	NA
QC	20	18	-8%
Background	6	6	0%
Rerun	63	47	-24%
Patients	787	771	1%
<2 Years Age	12	11	-6%
Sampler	760	727	-2%
Manual	116	91	-20%
STAT	218	229	7%
Positive	315	342	11%
Negative	519	467	-8%
Analysis Error	16	10	-36%
No Patient ID	135	101	-24%
Positive (Diff)	19	17	-9%
Positive (Morph)	71	72	4%
Positive (Count)	72	71	1%
Positive (Diff+Count)	9	7	-21%
Positive (Diff+Morph)	22	21	-3%
Positive (Diff+Morph+Count)	48	49	4%
Positive (Morph+Count)	74	75	3%
CBC	28	37	35%
CBC+DIFF	329	273	-15%
CBC+DIFF+NRBC	36	28	-21%
CBC+DIFF+NRBC+RET	69	104	54%
CBC+DIFF+RET	12	10	-15%
CBC+NRBC	371	360	-1%
CBC+RET	2	3	53%
USER SELECT	3	3	2%
CBC+DIFF+NRBC No ID	21	2	-90%
CBC+DIFF+NRBC+RET No ID	68	66	-1%
Staffing M-F	7.1	6.5	-7%
Staffing Sat & Sun	4.0	5.0	28%
Total FTE	8.7	8.5	-0.3%
Productivity	111	119	9.2%
STAT TAT	13	12	-6%
Routine TAT	29	28	-1%

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Current - CBC TAT: Pre vs. Post

TAT	STAT (Min)	Routine (Min)	% Change Routine
Goal	≤30	≤45	
Jan-10	21	43	51%
May-10	13	29	55%
Jun-11	13	28	3%

Operating Parameters: May 2010 vs. June 2011

Performance Measure	Change	improvement?
Reruns	↓ 24%	Yes
Manual Aspirations	↓ 16%	Yes
Positives	↑ 11%	Yes
Negatives	↓ 8%	Yes
Positives (Diff Morph)	↑ 5.7%	Yes
Positive Count	↑ 11%	Yes
“No Patient ID”	↓ 24%	Yes

Operating Parameters: May 2010 vs. June 2011

Performance Measure	Change	2010	2011
Staffing			
FTE Total	↓ 0.3%	8.7	8.5
FTE: Mon – Fri		7.1	6.5
FTE: Sat & Sun		4.0	5.0
Total Productivity			
CBC/FTE/Day	↑ 9.2%	111	119
Slide Review	↑ 131%	26	60
DM96 use (Day Shift)		50	60

Reassessment of Lab #2

- Increase in slide review/production:
  - Field Service Rep. (FSR) visited account:
    - No technical issues noted
  - Technical Integration Specialist (TIS) visited account
    - No training issues observed
    - Slide review rate increased by 27%
    - Slide production increased by 47%
    - Rerun rate decreased by 24%
- Staffing levels have remained flat.
- Turnaround times:
  - Goals are being met.

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Solutions for Reassessment of Lab #2

- **Increase in slide review/production**
  - 100 samples through the system observed:
    - Concerns were confirmed
    - Supervisor made changes without TIS help.
- **Staffing levels have remained Flat**
  - Laboratory union has agreed to changes in job functions in new contract.
  - 2.0 FTE less labor will be required for CBC production.
- **Turn Around Times**
  - Goals are being met
  - TAT improvement anticipated as less hands-on required

Thank You.

Questions?