Adopting Lean to Surgical Pathology

Henry Ford Production System

Manufacturing Based Quality Improvement in Pathology & Laboratory Medicine

Richard Zarbo, MD, DMD

Henry Ford Health System, Detroit, MI

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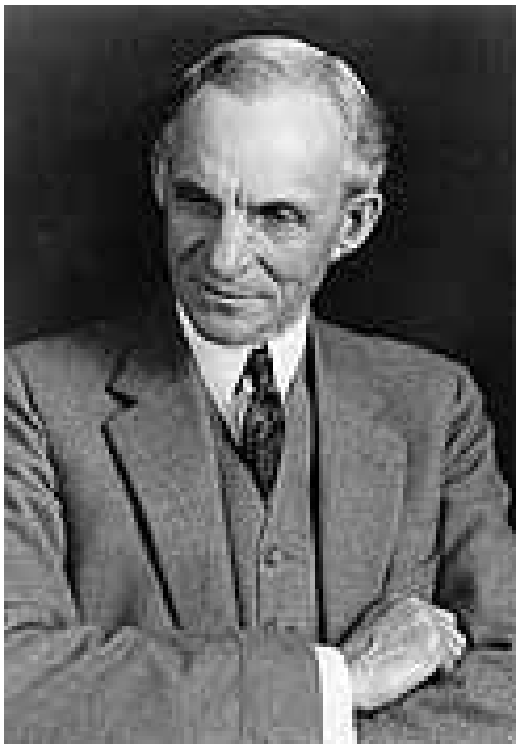
Change is in our DNA

"We do not make changes for the sake of making them, but we never fail to make a change once it is demonstrated that the new way is better than the old way. We hold it our duty to permit nothing to stand in the way of progress…."

-Henry Ford



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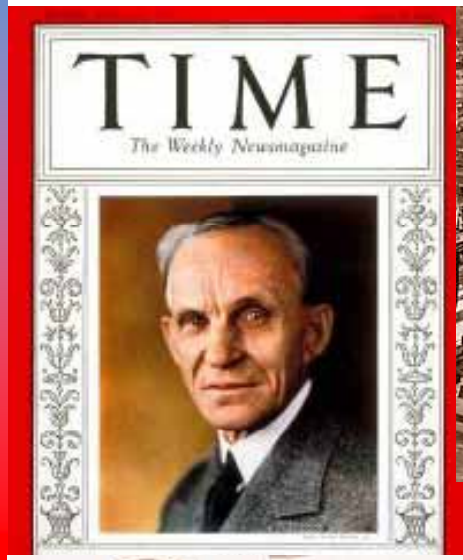
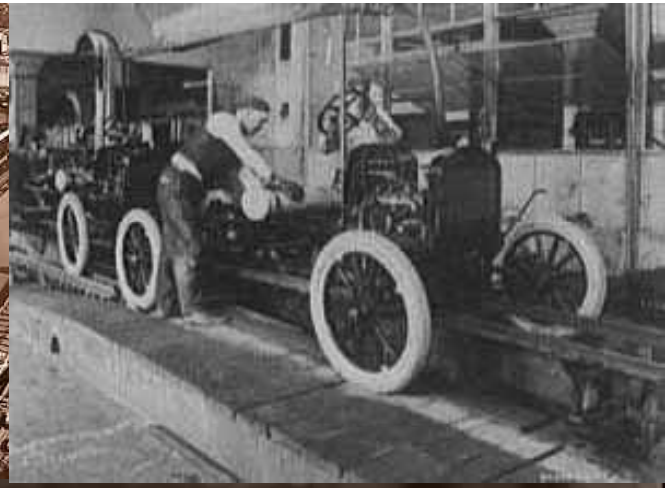
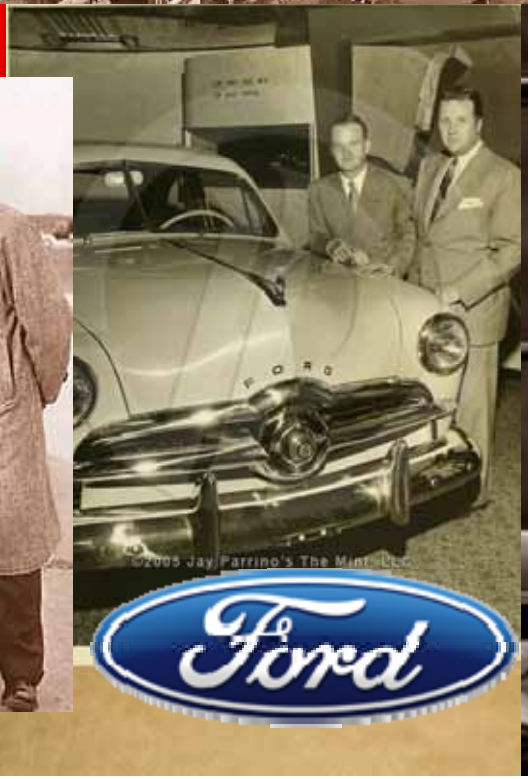
Creating a Mass Production Culture







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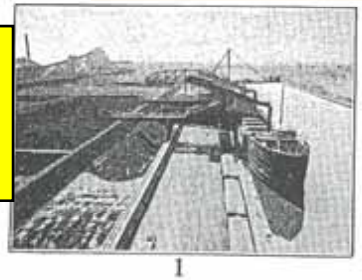
Mass Production - Continuous Operation

SHORTENING THE PRODUCTION CYCLE

Sat. night



1

One of the most noteworthy accomplishments in keeping the prices of Ford products low is the gradual shortening of the production cycle. The elapsed time between the receipt of raw material and its appearance as finished merchandise in the hands of the dealer bears strongly on the retail prices. The longer an article is in the process of manufacture and the more it is moved about, the greater is its ultimate cost.

During the period of business depression in 1920, the Ford production cycle was cut from 21 to 14 days. Today the Ford production cycle has been further reduced as here illustrated.

MONDAY 7 P. M.

1 After a trip of approximately 48 hours from Marquette the ore boat docks at the River Rouge Plant. Hulett unloaders start removing the cargo, which is transferred to the High Line, and from there to the skip car which charges the blast furnace. By continuous process this takes 10 minutes.

TUESDAY 10:55 A. M.

2 Sixteen hours later the ore has been reduced to foundry iron. It is then cast into pigs and sent to the foundry, where, mixed with certain proportions of scrap, it is remelted. This takes about four hours in all. Blast furnace metal is also cast direct, in which case four hours are saved.

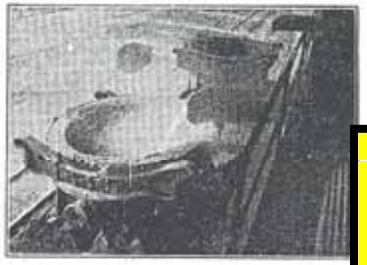
TUESDAY 12:55 P. M.

3 As the conveyor brings the moulds past the pouring station the hot metal is cast into cylinder blocks. These then go to the shake-out station and are taken away to cool and be cleaned. The cooling and cleaning process requires several hours.

TUESDAY 5:05 P. M.

4 The casting now goes to its first machining operation. There are 58 operations in all, all of which are done in approximately 55 minutes. All these are performed in the foundry building—a departure from conventional foundry practice, but in line with the Ford method of continuous operation.

2



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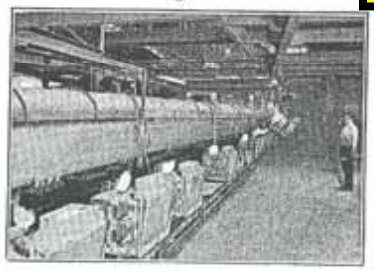

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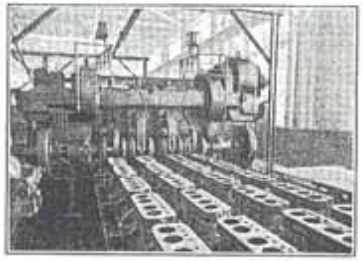
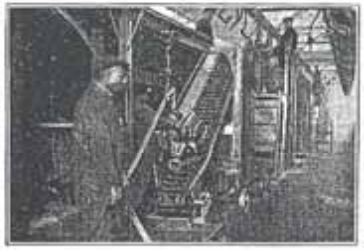


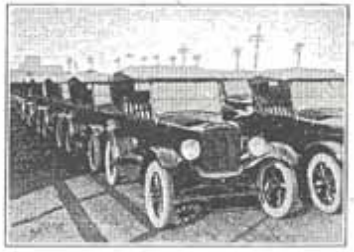
3 ½ days

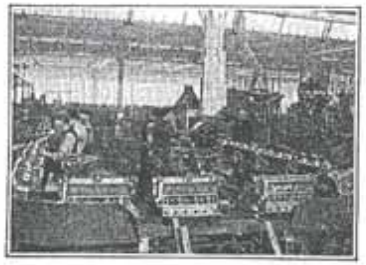
6



7

8





5

TUESDAY 6 P. M.

5 About 6 o'clock the motor block is ready for the assembly line. Ford mechanics have reduced the time required for motor assembly to an average of 97 minutes. This includes everything, even an electrically controlled block test. Except for "running in" the motor to loosen it up everything is done "on the move."

TUESDAY 7:45 P. M.

6 The finished motor coming out over a trunk line conveyor is loaded into a freight car with the aid of the device illustrated and shipped to a branch for assembly into a finished car. A constant stream of freight cars leave the plant day and night.

WEDNESDAY 8 A. M.

7 Arriving at the branch plant the motor is unloaded and sent to its station on the final assembly line. These assembly lines are standardized the world over and represent specialized workmanship at the peak of efficiency. In 4 hours the car is ready to be driven away.

WEDNESDAY 12 NOON

8 By noon the dealer delivery of the car ar the case of drive-aways brings his customer to th the deal then and there version of raw material t mately 41 hours, 12 of v for shipping between th Detroit branch when fin place. When final assem one of the more distant branches, the time is, of course, increased by the number of hours in transit.

Wed. noon

From: The Ford Industries. Ford Motor Co., 1925

Mass Production

Year	Production	Price of Model T Touring Car
1903	195	
1903-4	1,513	
1904-5	1,695	
1905-6	1,599	
1906-7	8,759	
1907-8	6,181	
1908-9	10,660	$950.00
1909-10	19,051	780.00
1910-11	34,979	690.00
1911-12	76,150	600.00
1912-13	181,951	550.00
1913-14	264,972	490.00
1914-15	283,161	440.00
1915-16	534,108	360.00
1916-17	785,433	360.00
1917-18	708,355	450.00
1918—		
Aug. 1, 1919	537,452	525.00
Aug. 1, 1919—		
Dec. 31, 1919	401,982	575.00
1920	1,074,336	440.00
1921	1,013,958	415 00
1922	1,351,333	384.00
1923	2,090,959	295.00
1924	1,993,419	290.00
1925	1,990,995	290.00

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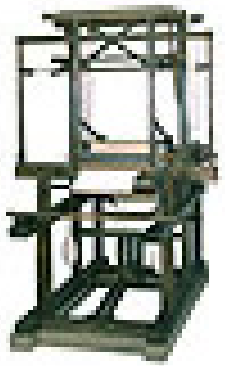
Improving & Sustaining a Culture



The Passionate Pursuit of Perfection

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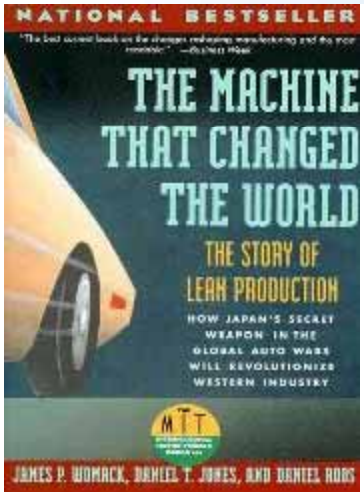
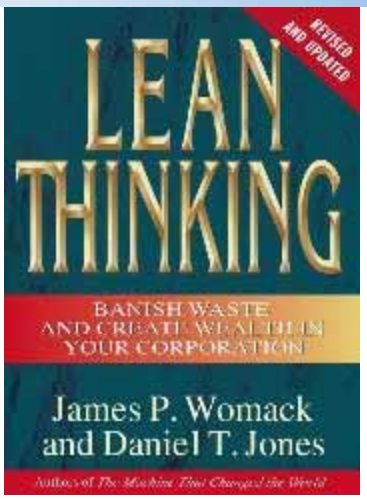
LEAN

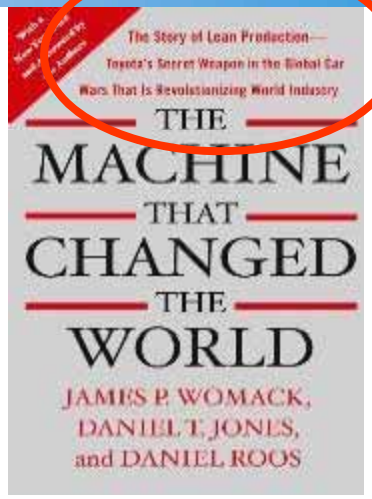
Toyota's Unique Mass Production Processes



1991



2003



2007

The Story of Lean Production- Toyota's Secret Weapon in the Global Car Wars That is Revolutionizing World Industry

Detroit Free Press
www.freep.com

Toyota posts record $14-billion profit

May 9, 2007

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The Inventors

Change	Top-down directive	Bottom-up empowerment
Production	Mass production Push Capacity/Forecast	Beyond production Pull Continuous flow/demand
Innovation	Automation	Autonomation
Suppliers	Short term contract	Long term partners
Goal	↓ waste, time	↓ non-value added steps
Outcome	Maximize profit	Maximize quality

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Pathology Production Analogies

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	OLD	NEW
Change	Top-down directive	Bottom-up empowerment
Innovation	Throughput, work harder	Technology, work smarter
Production	Batch mode	On demand
Flow	Push/capacity	Pull/continuous flow
Rate	Capacity/staffing	Demand/priority
Suppliers	Short term contract	Long term partners
Goal	↓ waste, time	↓ non-value added steps
$$	↓ cost	↓ cost

Cultural Revolution

Sustainability?

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Brave New World?

"-Adopt the new philosophy.

-We are in a new economic age.

-Western management must awaken to the challenge, must learn their responsibilities, and take on leadership for change."

W. Edwards Deming

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Foundation of TQM, CQI, Lean

"-Improve constantly and forever the system of production and service, to improve quality and productivity, and thus constantly decrease costs."

-Put everybody in the company to work to accomplish the transformation.

-The transformation is everybody's job."

W. Edwards Deming

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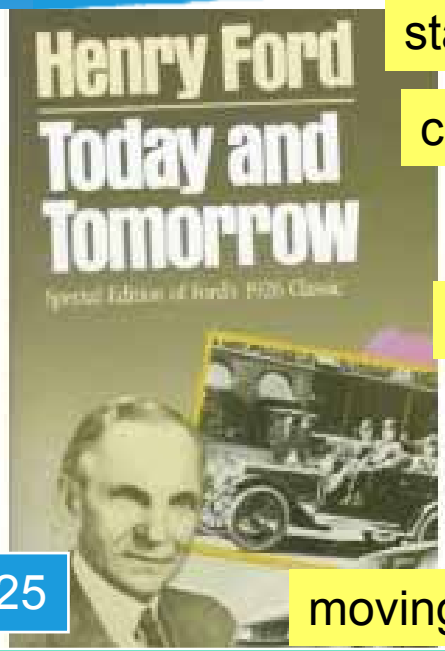


standardization

coordination

waste

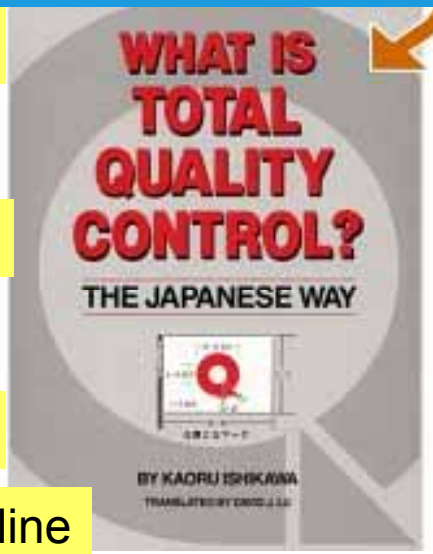
cleanliness

timing

cycle time

moving assembly line

1925

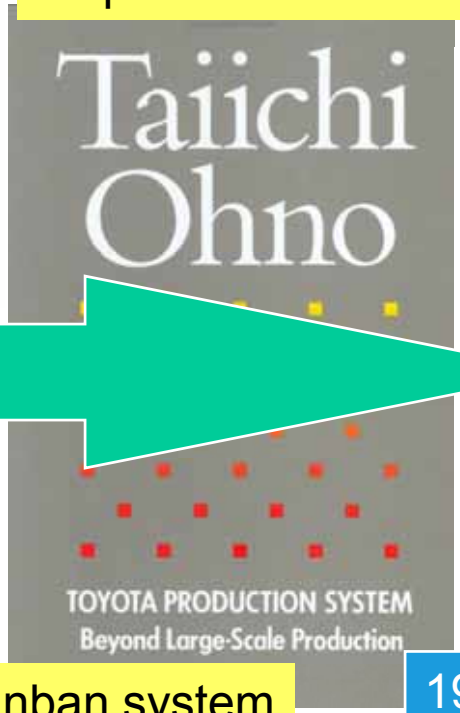


just-in-time inventory

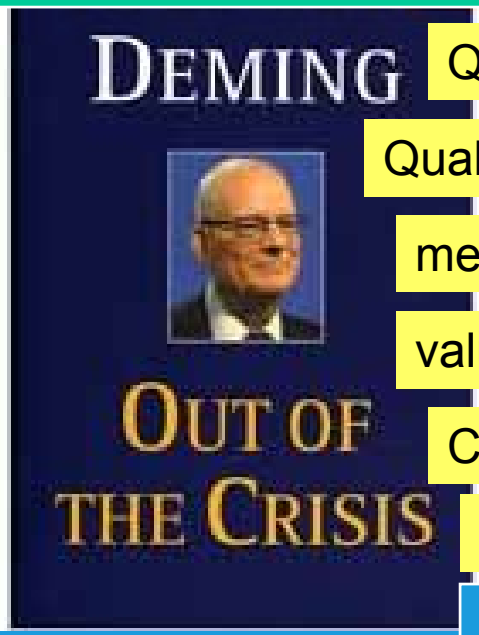
Pull production

one at a time production

empowered workforce



Foundations of LEAN



Quality focus

Quality control

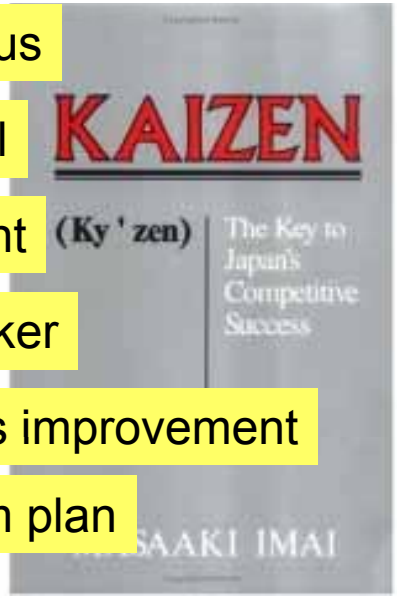
measurement

value of worker

Continuous improvement

Long term plan

1986



Kanban system

continuous flow

rapid changeover

error proof machines

1978
1988

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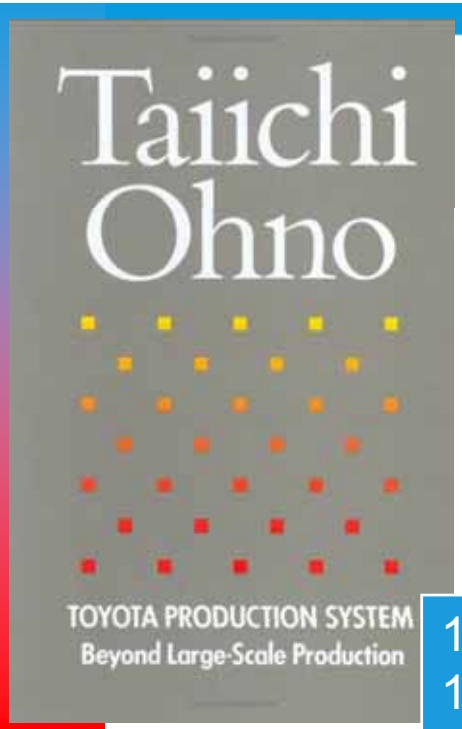
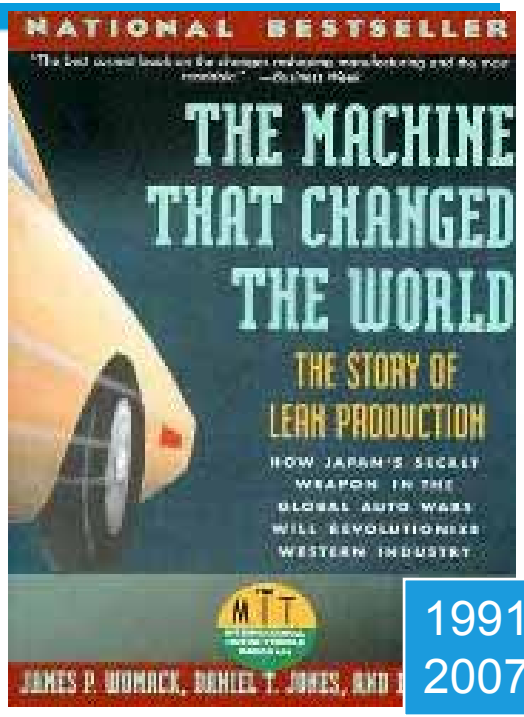
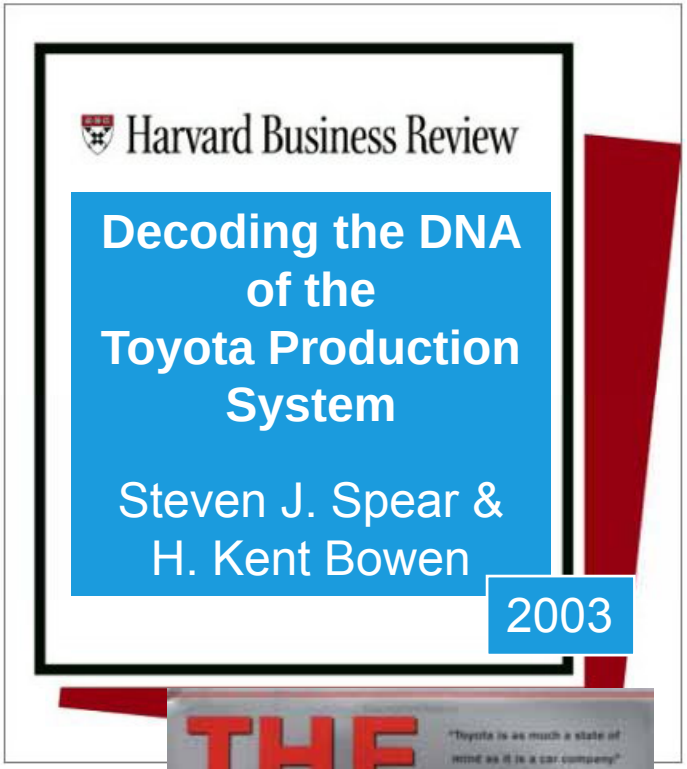


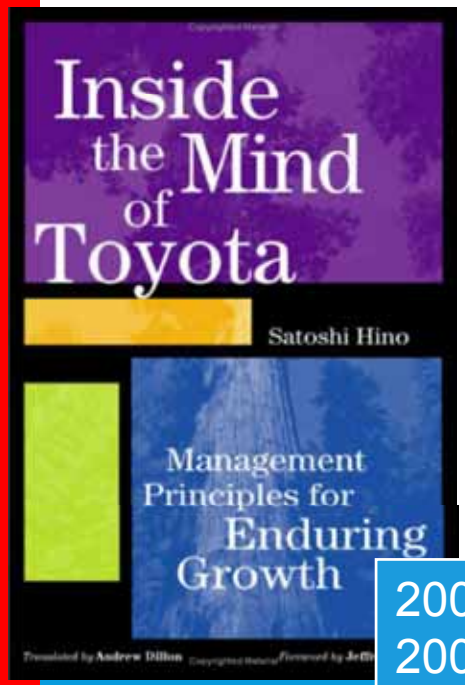
1978
1988



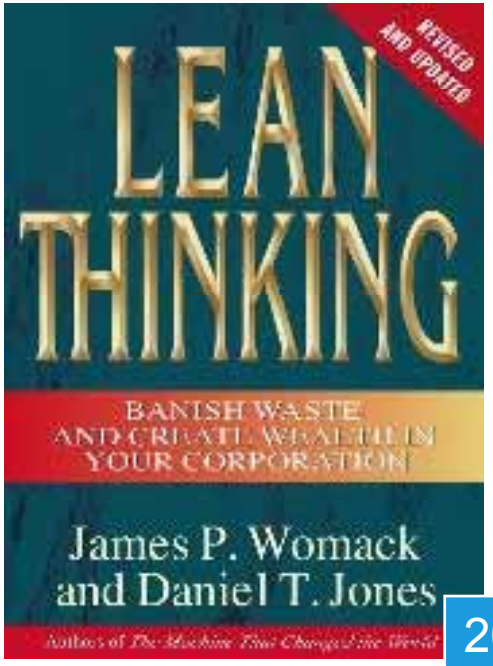
1991
2007



2003



2002
2006



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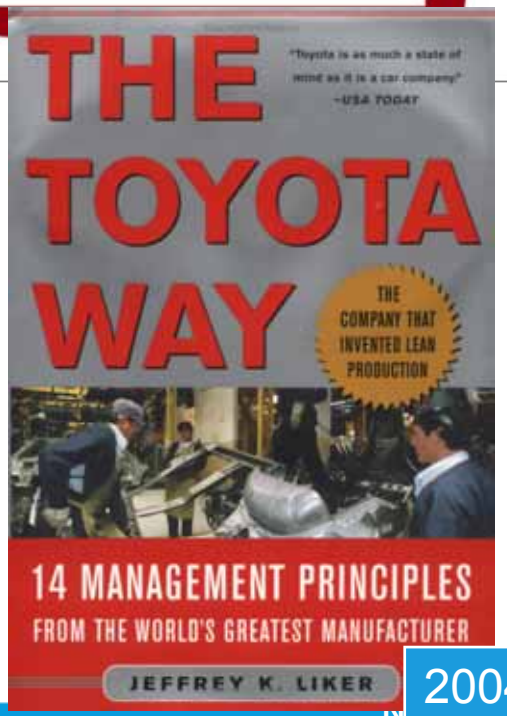

2004

What is Lean?

Specify Value Desired by Customer

- Identify value stream & challenge all wasted steps
- Manage towards perfection

Reduce & Eliminate Waste, Continually

- Overproduction
- Time waiting
- Transportation
- Processing
- Stock on hand
- Movement
- Defective products

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Operational Principles

Rules & Ideals

- No waste
- Defect free
- Highly specified work, pathways, connections
- Customer-Supplier communication
- Continuous flow production
- One at a time (small batches)
- ‘Pull’ production between steps
- Production on customer demand
- Immediately
- Safely

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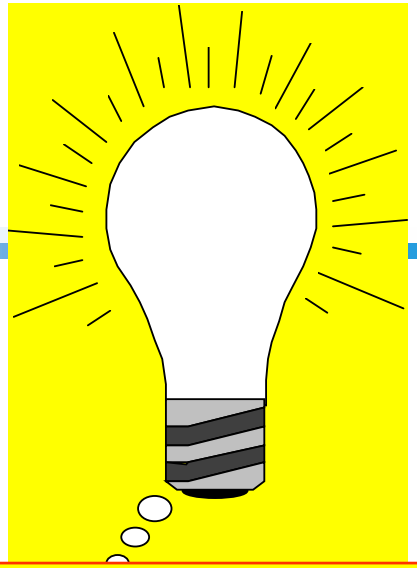
Sounds Good….



But how to implement?

KEY

Back to Deming's 14 Principles
Shades of TQM done right

Culturally transform & sustain worker's approach to work

- Leadership driven
- Create organizational & value structure
- Define roles of middle management and worker
- Worker- value, respect, empower & protect
- Align incentives
- Recognize & reward
- Educate & develop workforce & next leaders

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Challenges

Leadership & Operational

Leadership staff Technical staff Cultural	▪ Management style, comfort ▪ Workload, free time ▪ Alignment of incentives, account-ability for process improvements
Resource support	▪ Data collection, analysis, education, meetings, feedback
Scientific rigor Technologic support	▪ Team oversight & integration ▪ LIS program constraints, granularity of available data,
Risk	▪ Capital $, partnerships, failure

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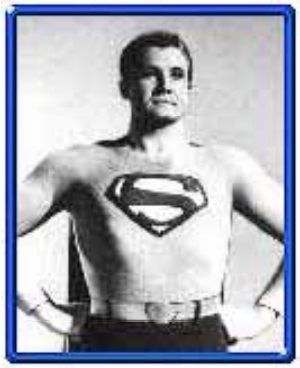
Empowerment

EMPLOYEE

- "Has knowledge, skills, authority & desire to decide and act within prescribed limits.
- Takes responsibility for the consequences of the actions and for contribution to the success of the enterprise."



Juran JM, Godfrey AB: Juran's Quality Handbook, 1999

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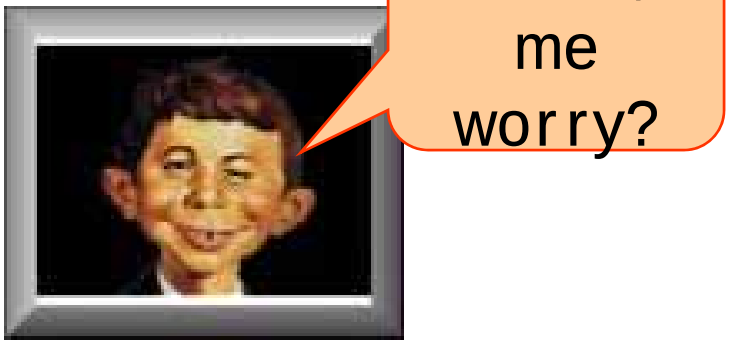
People Challenges

- Communicating, interactive learning workforce
- Sensitivity to how people work together
  - Personality types, attitudes, styles, skills, likes
- 16 Myers-Briggs personality types*
  - Extravert - Introvert
  - Sensing - Intuitive
  - Thinking - Feeling
  - Judging - Perceiving



- Creator, connector, developer, doer**

*Carl Jung/Isabel Briggs-Myers

** Peter Merrill

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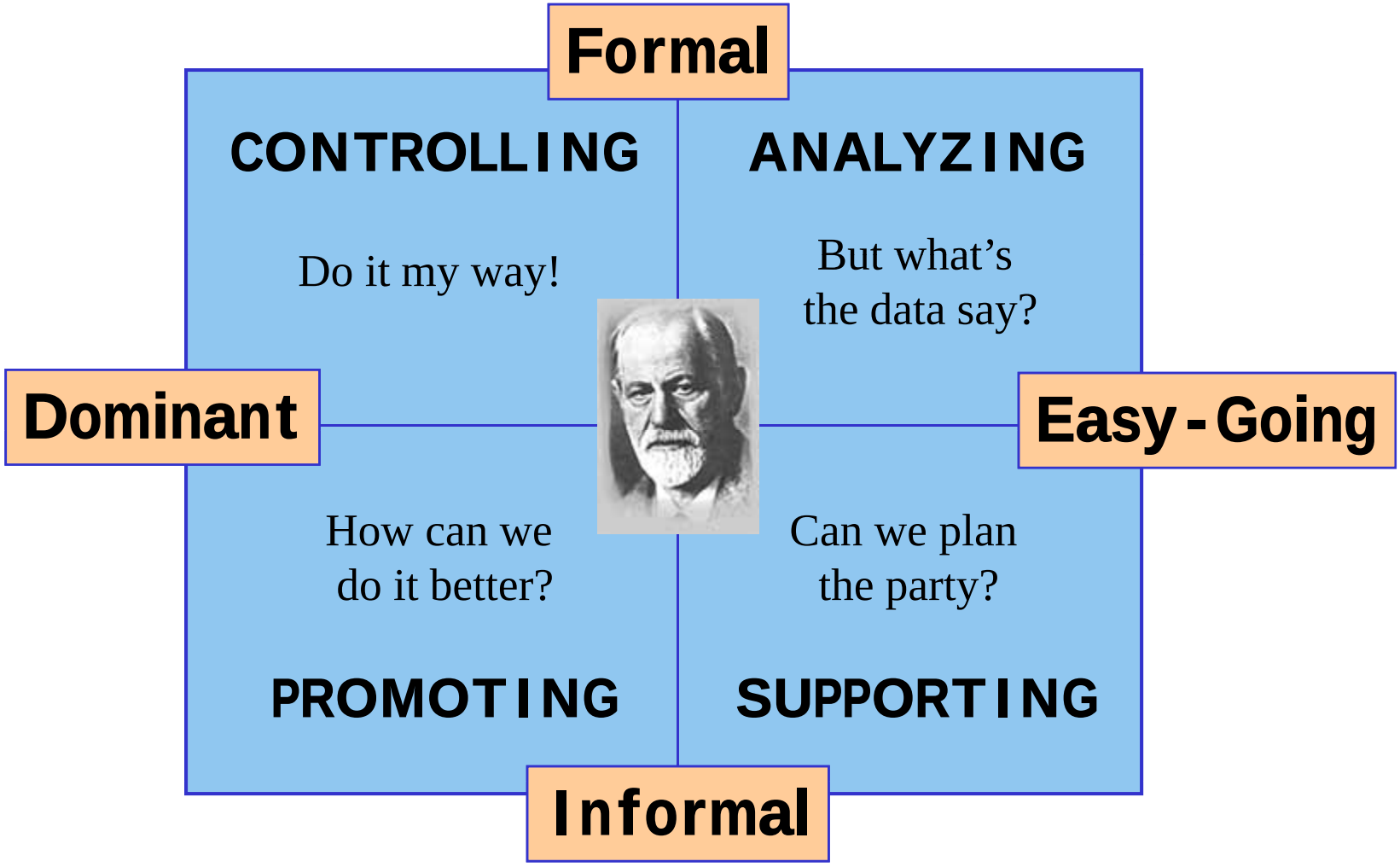
Matrix Styles



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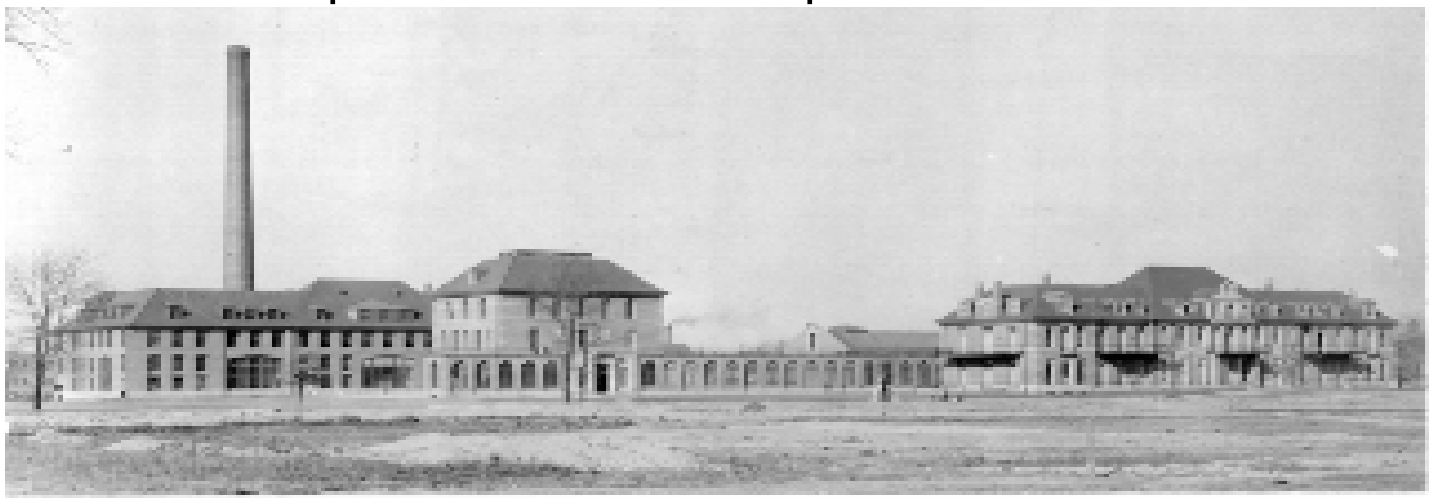
A Brief History of HFH

- Henry Ford Hospital founded October 1, 1915
  - By Henry Ford as sole owner and president
  - Clara's honey-do list success
- Closed staff, after Mayo Clinic
  - Integrated in-patient & out-patient care delivery
  - Each patient examined by at least 3 Drs, independent diagnoses
  - "Second opinion" built into the process



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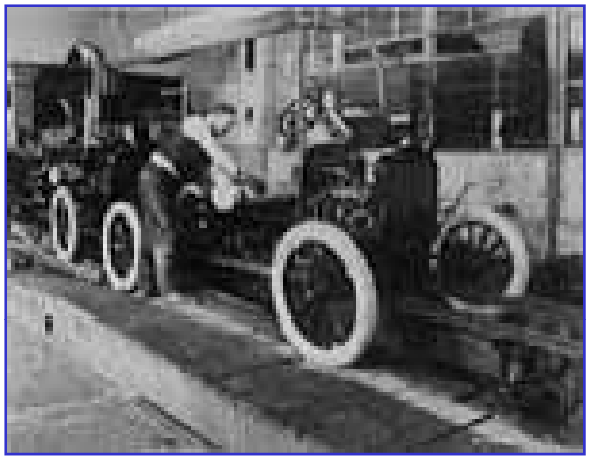
Ford Healthcare Philosophy

Standardization



"It seems reasonable that a **permanent staff** be responsible for the work that goes on in the hospital. After all, I don't ask every person who wants to build a car to come into my factory to build it. The Ford Motor Company is responsible for the car it makes.

Why should not the hospital be responsible for the medical work that is done there?"

– Henry Ford

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Lab, founded in 1917….

1931

1940

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And now….

- Pathology Product line founded in 2002
  - Main hospital, 23 regional med centers, 6 affiliate hospitals, span 40 miles SE Michigan
  - 15th largest hospital based lab USA
  - > 6.5 Million annual tests
  - >10% of System revenue
  - Testing = 70% EMR, 90% medical decision-making

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Background

"Every well thought out process is simple"
-Henry Ford

- Henry Ford Production System
  - Manufacturing-based continuous QI, began 2004
  - Based on Henry Ford & Toyota
  - Training- Pittsburgh Regional Health Initiative
  - 'Zero defect' performance goal
  - Cultural transformation of work- **KEY**
- Surgical Pathology Laboratory- year-long pilot
  - Empowered work teams, 77 participants
  - >100 process improvements, 2006-2007
- Global improvements
  - Timeliness reporting 
  - Defects and waste 

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Starting

"Today's best, which superseded yesterday's will be superseded by tomorrow's best"
-Henry Ford

"Let's just start cutting and see what happens."

• QA	1985
• TQM- CQI	1988
• Benchmarking	1990
• TPS-Lean	NOW

Cultural Transformation THE PLAN…

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Cultural Transformation

Transform approach to work

- Not just showing up for work, but arriving to do the work better

Empowered workers who see their daily work in the context of-

Continually learning

Constantly communicating

Making effective process improvements

Designed and tested by scientific method

***"Our system of management is not a system at all; it consists of planning the methods of doing the work as well as the* work."**
-Henry Ford

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HFPS Guiding Principles

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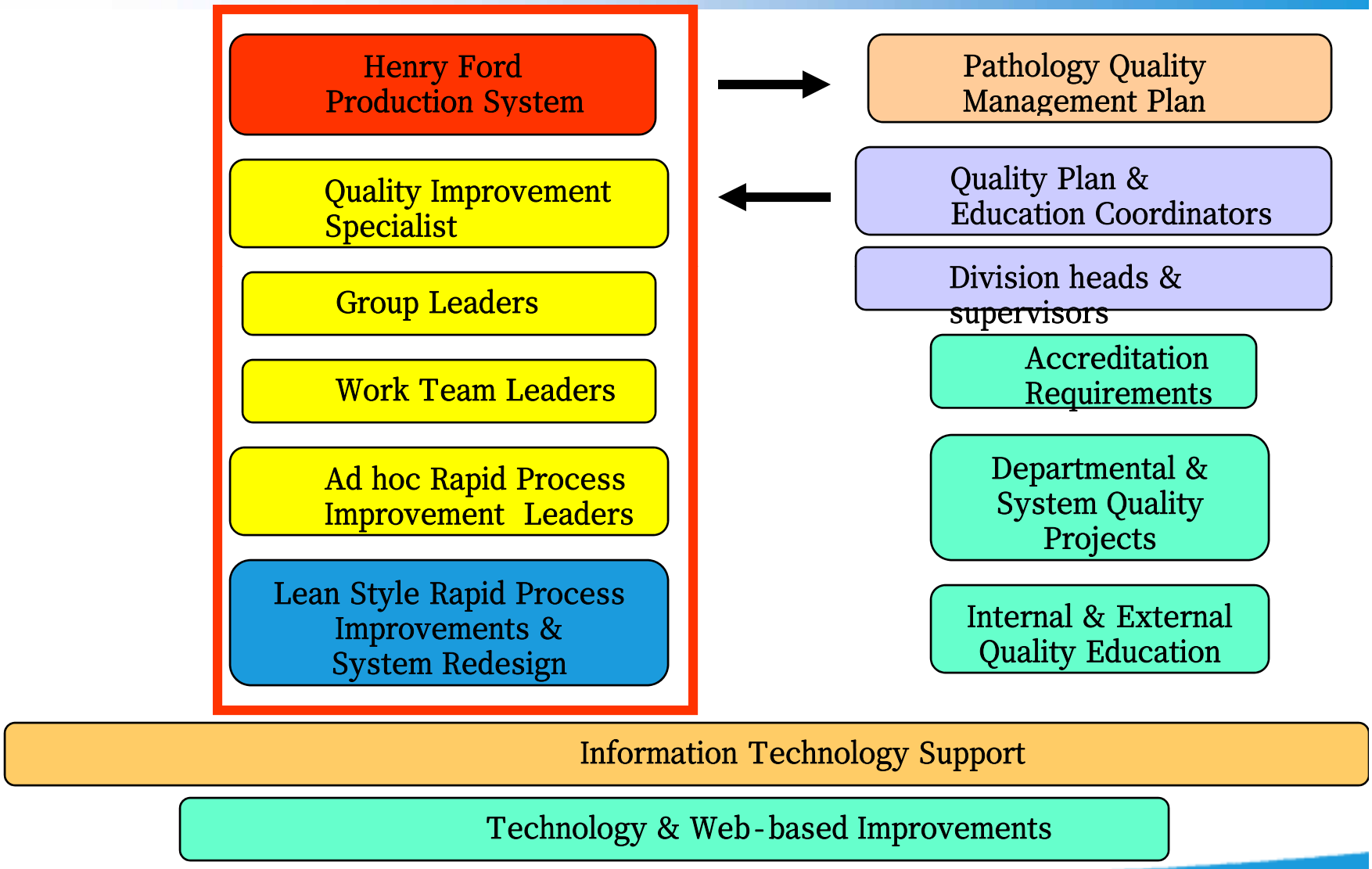
Vision	We will be “best in class”, striving for zero defects
Mission	Continually perfect processes & patient safety
Values	Our people, partners & patients are most important- Treated w/ respect, understanding, & cooperation
Strategy	Adapt & innovate Lean & TPS principles to HFHS Pathology & Laboratory Medicine
Cultural Change	Empowered workers, continuously learning, making scientifically based improvements that standardize process & eliminate waste, moving daily & continuously toward the ‘ideal’

Organizational Structure



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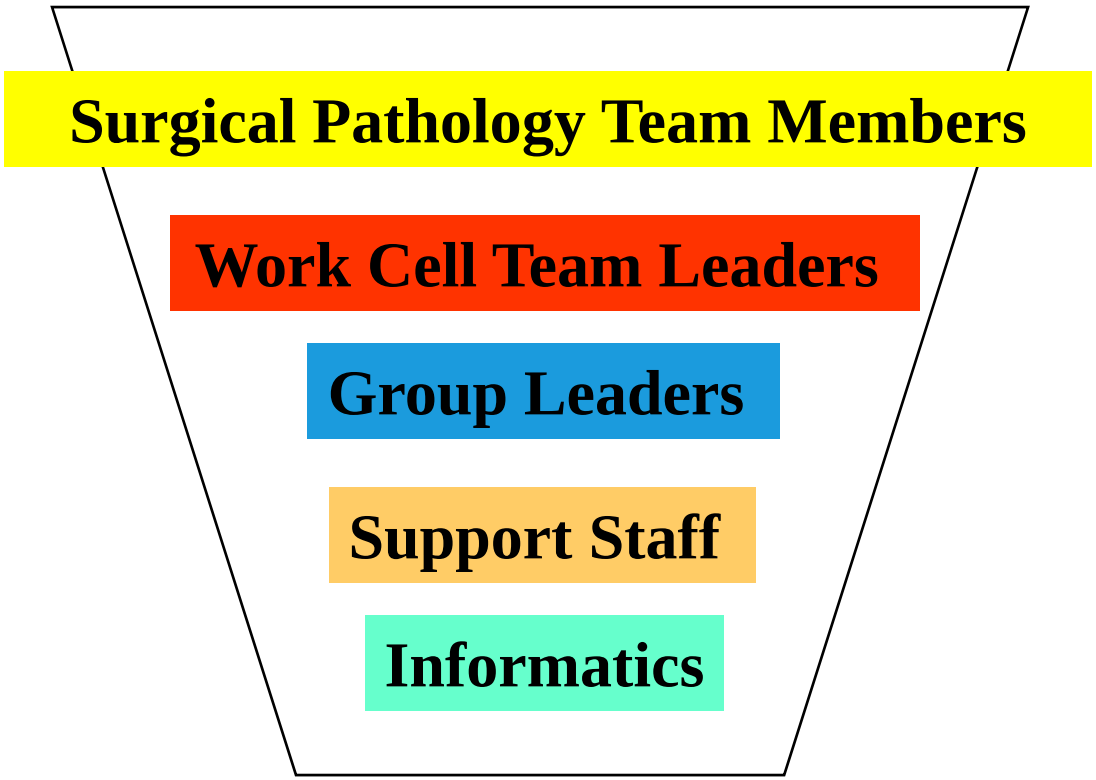
Inverted Pyramid

"Your success will be affected by the quality and quantity of new ideas you suggest."
-Brian Tracy



Quality Initiatives

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Continual Education

Leader & team member training
Credo card reinforcement
Internal Customer-Supplier mtgs, wkly
'Share the Gain' mtgs, monthly

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Credo card

Steps of Quality	Motto	Employee Promise	Credo
Doing the ***RIGHT*** thing, the ***RIGHT*** way, at the ***RIGHT*** time ***"Our invariable reply to 'It can't be done' is, 'Go do it'."*** *-Henry Ford*	Continually striving for ***Zero Defects*** to be the ***"Best In Class" Laboratory*** in the World.	Together we will strive for ***Perfection*** by applying principles of mutual respect, integrity, understanding, cooperation and effective Communication.	I am ***Empowered*** To work with my colleagues to make changes, based on HFPS principles, to make things right for ourselves, our clinician customers and our patients.

HFPS Basics	HFPS Basics	Sources of Waste	Henry Ford Production System
1. ***NO WASTE*** 2. ***DEFECT FREE*** 3. Highly specified ***WORK*** 4. Highly specified ***PATHWAYS*** 5. Highly specified ***CONNECTIONS*** 6. Continuous ***FLOW PRODUCTION***	7. *ONE AT A TIME,* ***SMALL BATCHES*** 8. ***PULL*** production 9. Customer-Supplier ***COMMUNICATION*** 10. Production on customer ***DEMAND*** 11. ***IMMEDIATELY*** 12. ***SAFELY***	▪ Overproduction ▪ Time waiting ▪ Transportation ▪ Processing ▪ Stock on hand ▪ Movement ▪ Defective products	***"Our system of management is not a system at all; it consists of planning the methods of doing the work as well as the work."*** *-Henry Ford*

Supplier Education – Owning the Process

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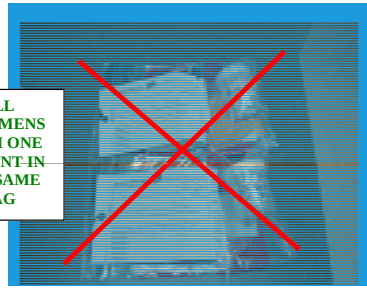
Department of Pathology & Laboratory Medicine
ANATOMIC PATHOLOGY

DO'S OF SURGICAL TISSUE SPECIMEN COLLECTION

1. Verify the patient identification prior to any specimen collection.
2. Identify the patient by using at least **TWO** patient identifiers, one of which is numeric and neither of which refers to the patient's location.
3. Each **specimen container** must be labeled in the patient's presence (**L**abel **A**t **B**edside) and must include the following information:
   - Patient's full name (Last name, First name)
   - Patient's medical record number (MRN)
   - Date of specimen collection
   - Time of specimen collection (time sensitive specimens)
   - Specimen description or anatomic site of origin
4. Specimens must be collected in the appropriate container with correct formalin ratio (1:10)
5. Ensure that all specimens for [illegible] Michel's media and specify if any other tests are required.
6. The label must [illegible] container.
7. Ensure that [illegible] closed to avoid formalin spillage.
8. Submit **one code for each procedure** performed on the patient.
   Place specimens from the patient in the SAME biohazard bag with a SINGLE requisition in the outside pouch.
   Double check specimens and lab requisitions for any labeling discrepancies before submission.

Clinician Supplier Education & Standardization



DON'TS OF SURGICAL TISSUE SPECIMEN COLLECTION

1. **Do Not** pre-label specimen containers prior to collection.
2. **Do Not** leave the patient until all specimen containers are labeled.
3. **Do Not** affix specimen label to the biohazard transport bag or the container lid.
4. **Do Not** label the lid with the specimen description.
5. **Do Not** send unlabeled specimens with requisitions.
6. **Do Not** send specimens from more that one patient in the same bag.

HENRY FORD HOSPITAL

Department of Pathology
&
Laboratory Medicine

ANATOMIC PATHOLOGY

Surgical Tissue Patient Identification & Specimen Collection

EFFECTIVE JULY 2006

LABORATORY CUSTOMER SERVICE

Telephone Support
Tel: 313.916.LABS (5227)

Hours of service
Mon – Fri 7:00 am – 5:30 pm

On-line Lab User's Guide:
http://pathology.hfhs.org/lug

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We are not Ford Motor Company, but similarities in medicine abound

"…with so many large, old and ailing companies, the real problem is in their culture – *in the structure, the habits, the deeply entrenched ways of doing business that, in many cases, date back 50 years. Too many….have created workplaces and work styles that are simply inappropriate*…." Alan M. Webber, USA Today 1/24/07

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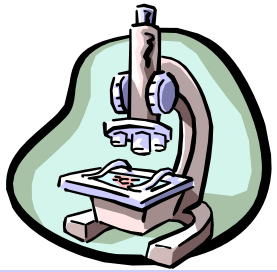
Surgical Pathology Business

Generic Industry

Raw material → Processing Technology → Product

Surgical Pathology



Human Tissue → Processing Technology → Diagnostic Report

formaldehyde, wax, knives, glass slides, microscope

85-150 years old

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"Go and See"

So what's it like to toil in a surgical pathology laboratory

?

Top down management- threatening
Workflow leveling- uncoordinated batches
Hiding defects- fear & blame
Lack of communication
No worker empowerment to fix
Worker creativity in bad system

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Surgical Pathology Work

SP Major Processes	Personnel in Sequence
Biopsy/Label	Surgeon, nurse, medical assistant
Transport	Clinic assistant or medical center lab tech
Accession	Pathology accessioner/transcriptionist
Tissue Gross Exam	Pathologists assistant (PA), resident or Pathologist
Processing	Histotechnologist
Embedding	Histotechnologist
Cutting	Histotechnologist
Staining/Cover	Histotechnologist
Case Collation	Histotechnologist
Delivery	Histotechnologist
Microscopic Exam	Pathologist, resident
Report Sign-out	Pathologist, resident

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Measuring Current Condition

- Process maps
- Value Stream Maps
- Survey staff
  - Sort/analyze data by site of defect generation & detection
- Develop indicators critical to quality
- Create measurement tools

"The old way was to guess. We cannot afford to guess. We cannot afford to leave any process to human judgment."
-Henry Ford

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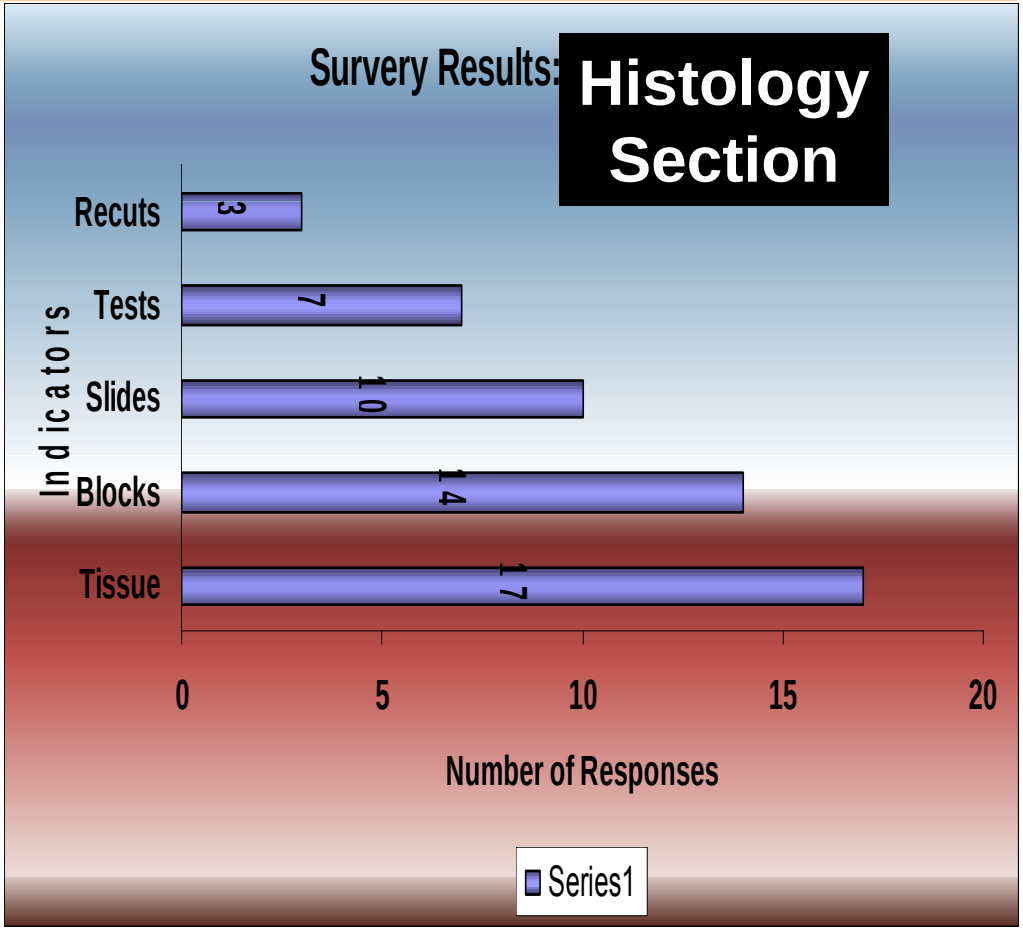
Staff Surveys

List the 10 top defects passed to you



Tissue

1. Tissue is not fixed well.
2. Tissue is not completely decalcified which makes the tissue hard to section well
3. Tissue too big to fit in the mold.
4. Tissue pops out of cassette.
4. Tissue in a block are not in the same level.
5. Grossed tissue too big to fit into blocks.
6. Tissue is too small or missing.
7. Unmarked or inappropriately marked.
8. Not enough tissue for recuts.
9. Tissue placed on wrong machine and improperly fixed.
10. Tissue is cut more then once for the same test.
11. Grossed too thick.
12. Tissue unfixed.
13. Tissue too thick.
14. Tissue not placed in the proper processor.
15 Little fixation time when cases are ordered too late.
16. Tissue too large.
17. Put on wrong procesor.

Blocks

1. Not filed orderly to pull for recuts.
2. Blocks not labeled correctly or missing information.
3. Label, mislabeled or no label.
4. Incorrect labeling.
5. Tag missing from the cassette for tissue embedding.
6. Inproperly labeled.
7. Incorrect number of blocks dictated under gross description.
8. Not filed in a timely manner.
9. Parts A and B must travel together.
10. No indication if more then one go to together. A & B.
11. Mislabeled.
12. Not enough labels or too many labels.
13. Incorrect numbers or levels.
14. Not filed in a timely manner.

Tests

1. Tests are not always ordered correctly.
2. Ordered tests do not always show up on the list.
3. Incorrect or not enough test initially ordered.
4. Special stains are ordered before the block in histology.
5. Pre order stains/recuts prior to prior to receiving in the department.
6. Improper forms are filled out.
7. Orders not clear.

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Targeted Measures

- Defects
  - Flaw, imperfection or deficiency in specimen processing requiring delay, stop work or return work to the sender. Non-interpretive, non- diagnostic.
- Waste
  - Process flaws -overproduction, time waiting, transportation, processing, stock on hand, movement & defective products

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Measurement Innovation

- Sensing the pulse of the “machine”
  - If you can’t measure it, you can’t fix it
- Measure current condition
  - The poor man’s Andon Board
  - Laminated, dry-erase posters, 4 x 5 ft in size
  - Defined menus/posters specific to process evaluated
  - Real-time, visual, publicly displayed
  - Captured at point of worker detection

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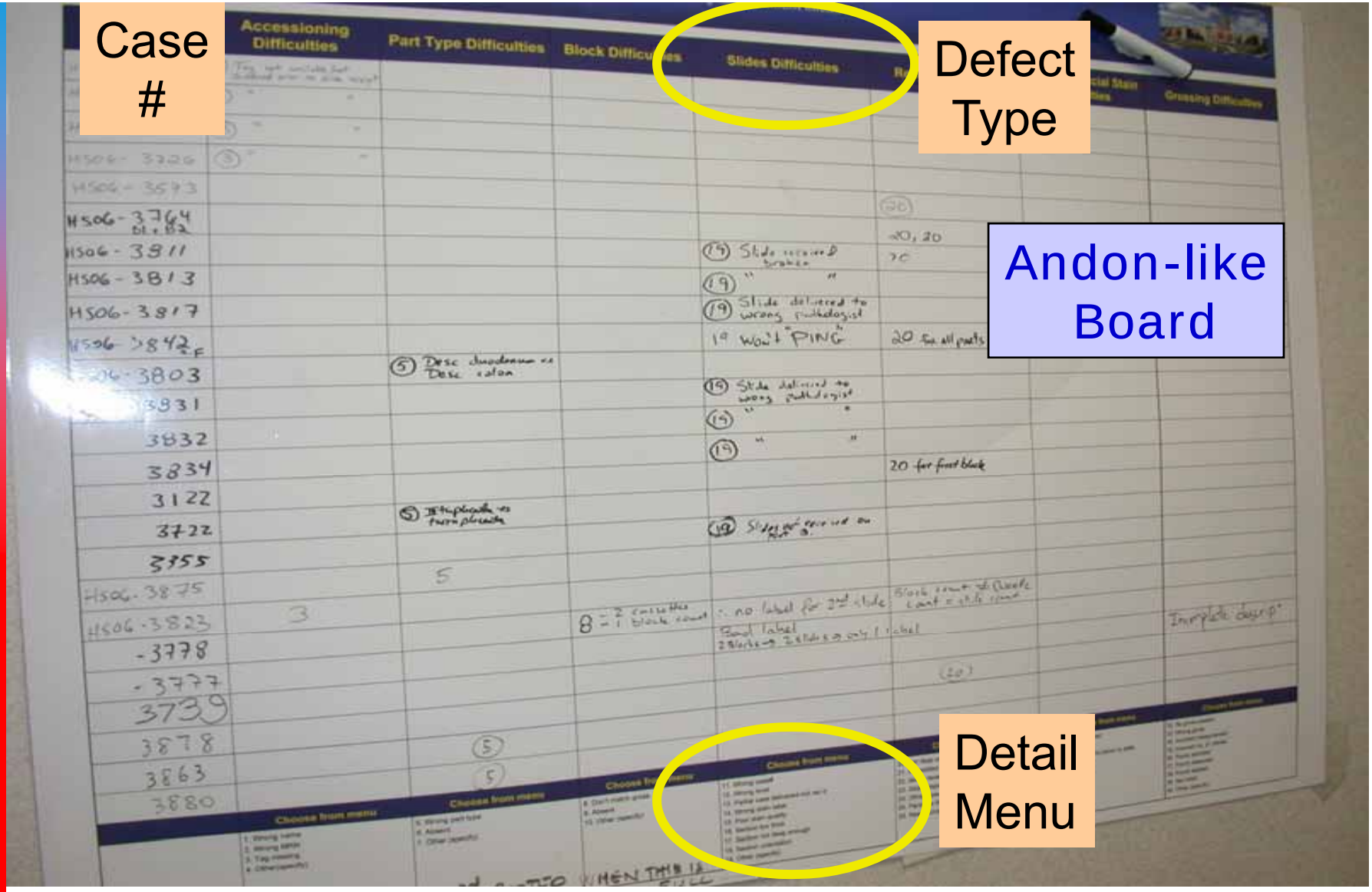
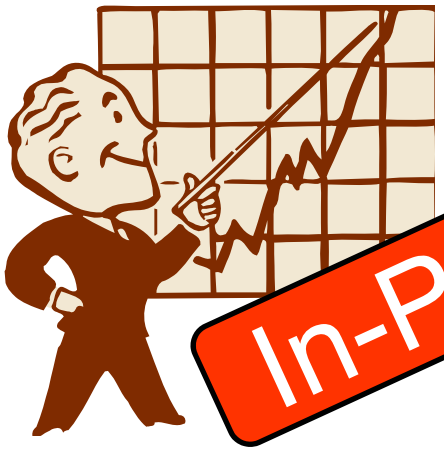


Data Collection Poster from Senior Staff Pathologists

SP Baseline Defect Rate

Data collection period: Jan 30-Feb 10, 2006
Volume: **1690** surgical path cases
Defective cases: **472**
Week #1: 32.2% Week #2: 23.5%
Overall: 27.9%

Nearly 1 in 3 SP cases is defective



In-Process Defects

Indicators = 100 from surveys
Data posters = 9
Personnel = 57
20 senior staff
37 technical staff

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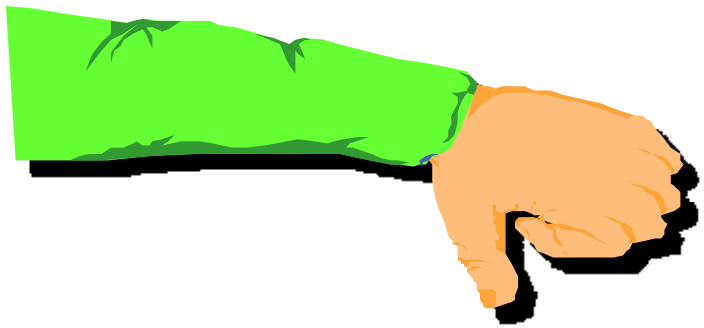
Reality testing

- Juran Institute estimates that 30% of direct healthcare outlays are due to poor process quality



Midwest Business Group on Health, Juran Institute, & Severyn Group, Inc (2003)

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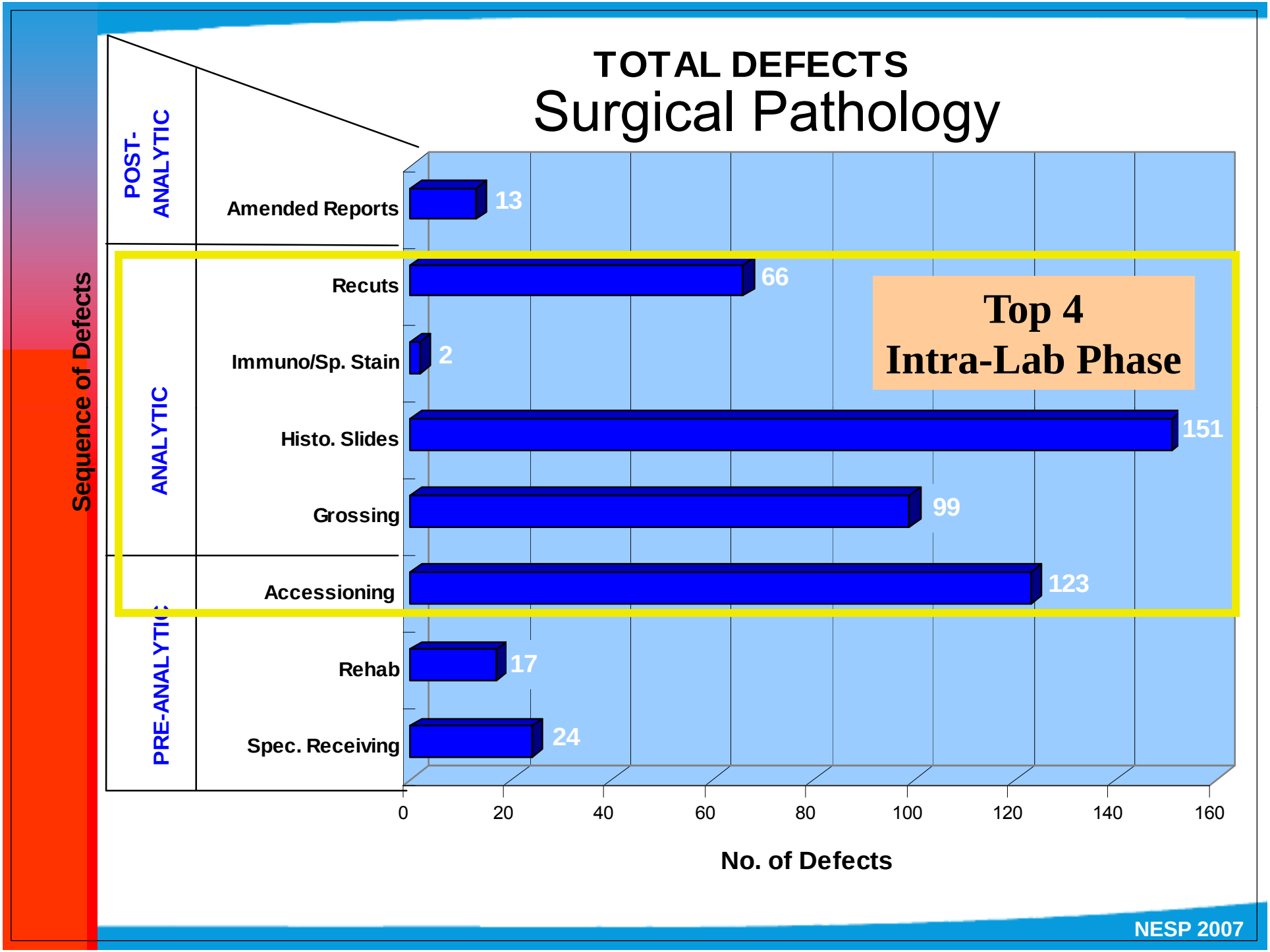

Quality Measure- Defects & Waste

Surgical Pathology

"You cant build a reputation on what you're going to do"
-Henry Ford

	2006	2007
Total SP Cases	1690	1791
Cases with Defects	472	223
Total Defects	494	288
	1 of 3 →	1 of 8
Defective Case Frequency	27.9%	12.5%

55% reduction

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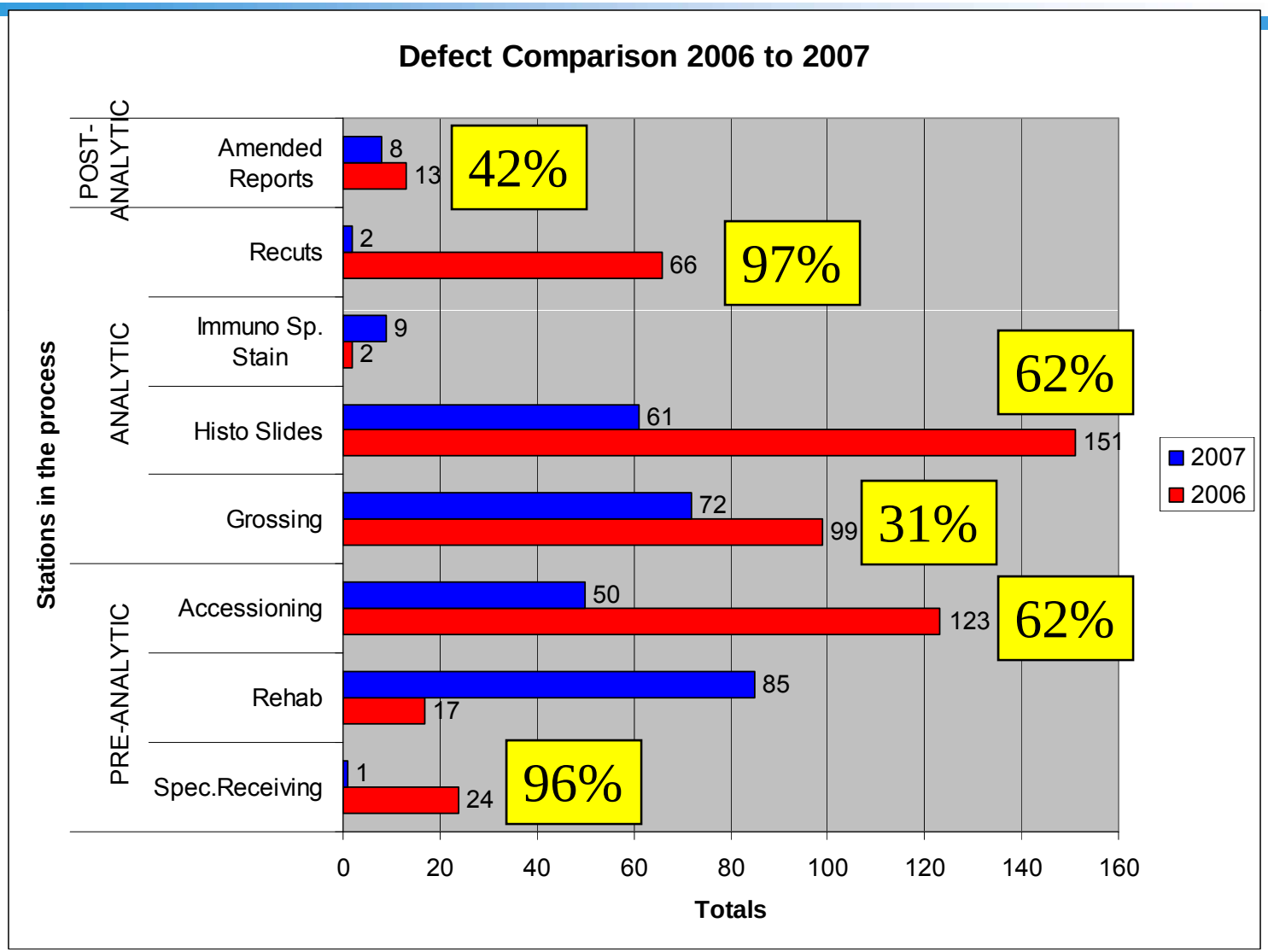
What a Difference a Year Makes



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Show and Tell

- Your tour
- What 77 workers in Surgical Pathology have accomplished in 10 months
- For example…..

"Our invariable reply to 'It can't be done' is, 'Go do it'."
-Henry Ford

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Process Changes

"Think you can, think you can't. Either way you're right."
-Henry Ford

Time elimination

- Global Goal: 95% of routine biopsy reports in 1 day of tissue receipt

"Time waste differs from material waste in that there can be no salvage.
The easiest of all wastes, and the hardest to correct, is the waste of time, because wasted time does not litter the floor like wasted material"
-Henry Ford

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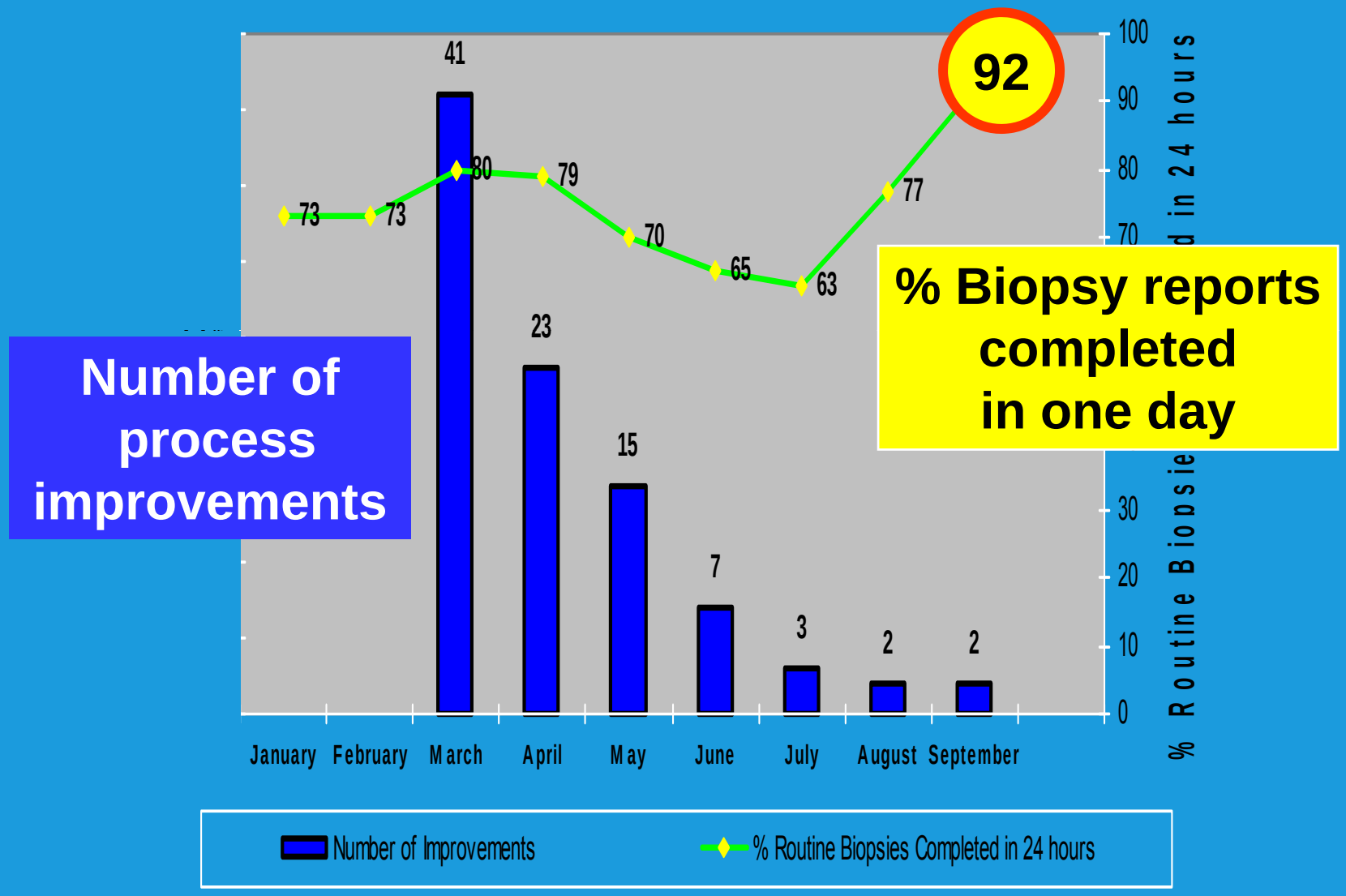
Routine Biopsy Turnaround Time
Result of Waste and Defect Elimination



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Process Changes

Workflow Simplification

- Elimination of loops & forks

"The thing is to keep everything in motion and take the work to the man and not the man to the work"
-Henry Ford

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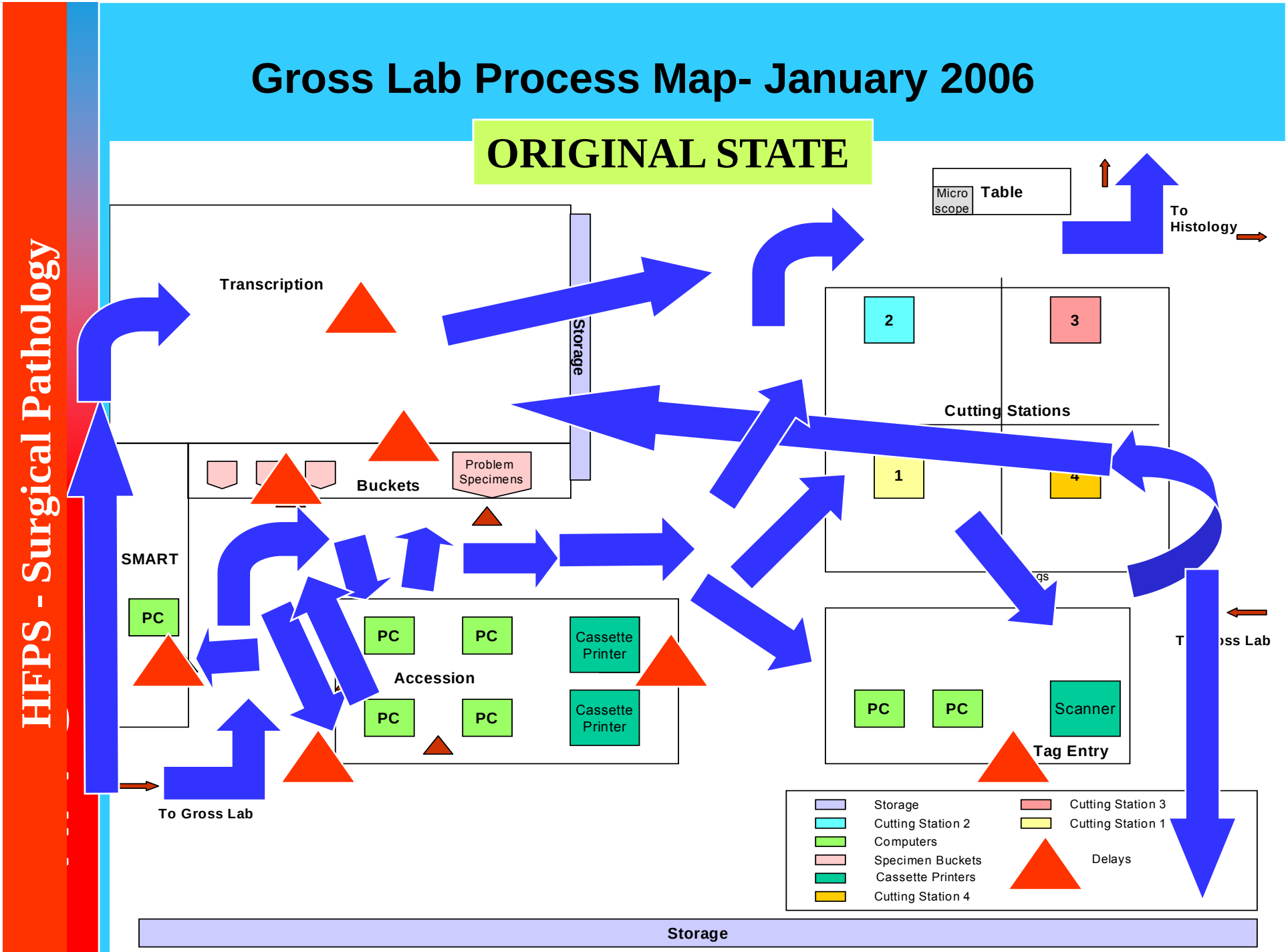
Gross Lab Process Map- January 2006

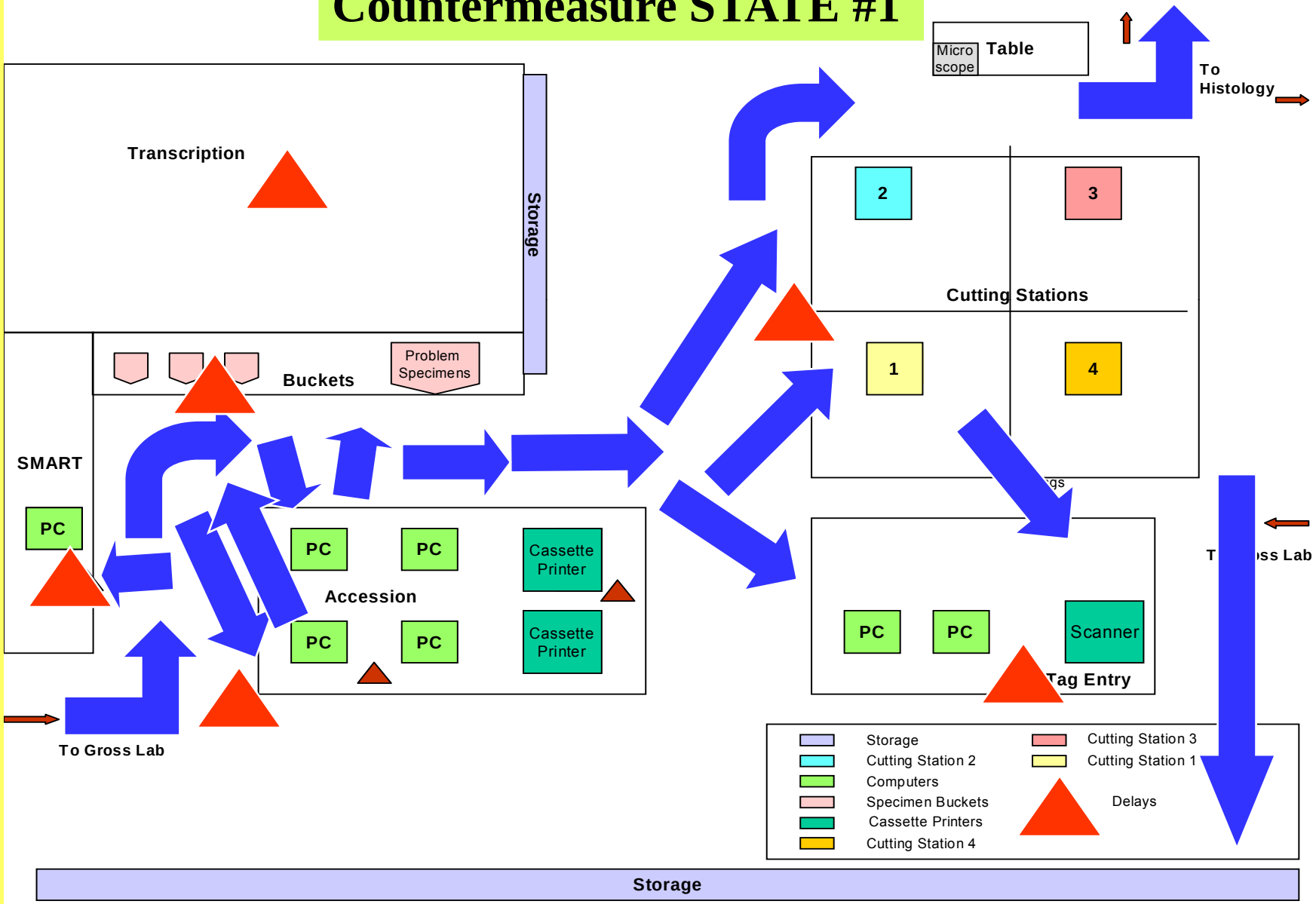
ORIGINAL STATE



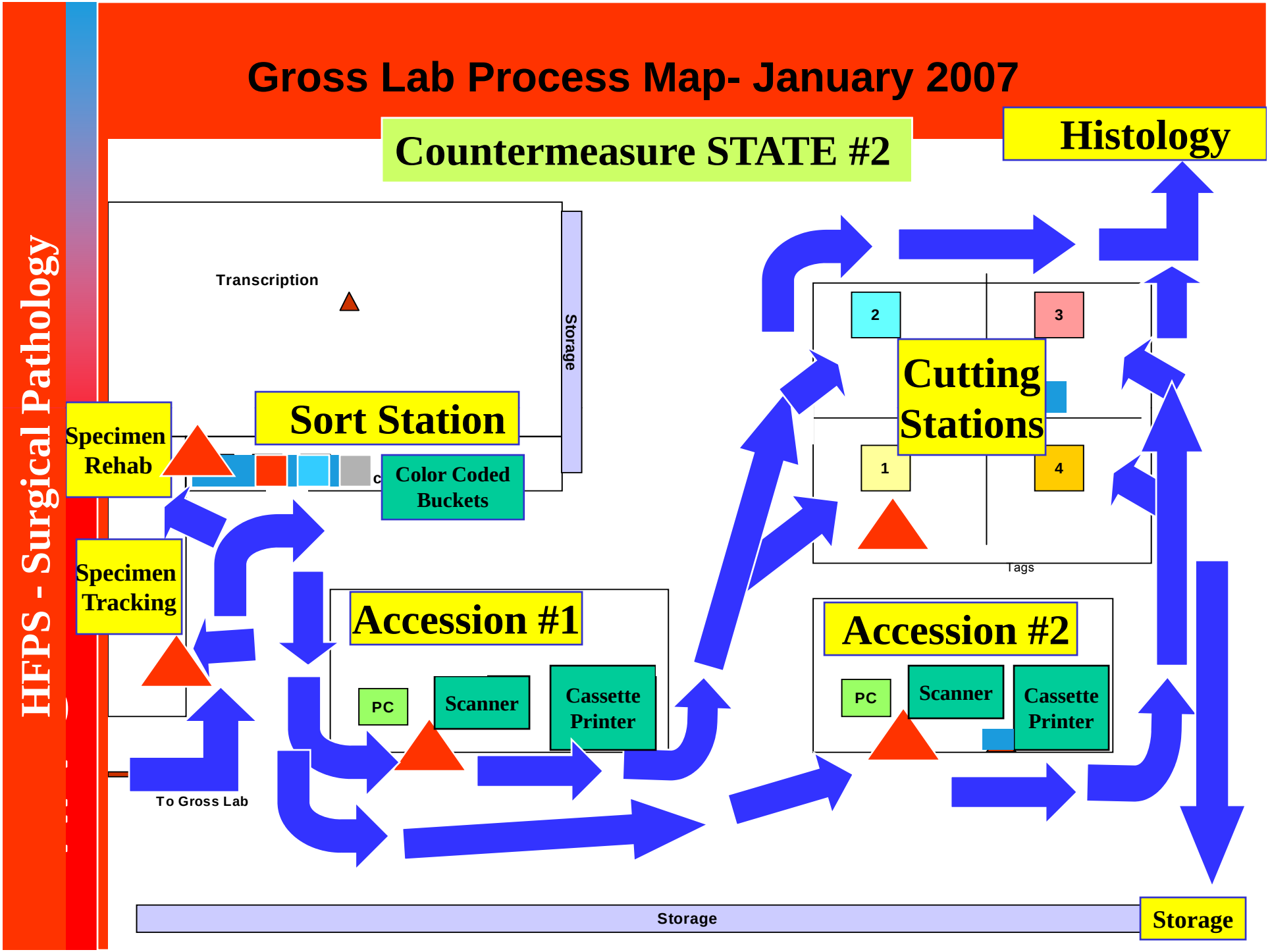
HFPS - Surgical Pathology

Gross Lab Process Map- March 2006

Countermeasure STATE #1



Gross Lab Process Map- January 2007



Process Changes

Leveling the workload

"Having a stock of raw material or finished goods in excess of requirements is waste…"
-Henry Ford

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Accession Process

Brown Bags by clinic → Zip-lock Baggies by patient
→ Jars by individual tissue biopsy specimens
→ Lab tags with required information, ea. specimen
→ All info transferred to computer system w/ fidelity

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Production Re-Design

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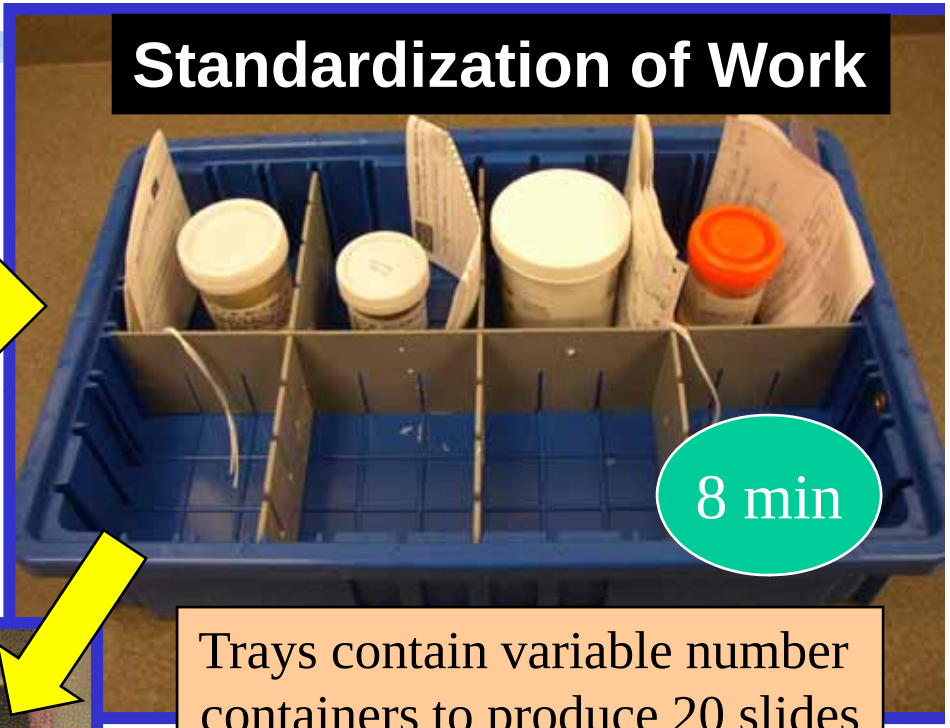
Workflow Leveling

Standardization of Work



Trays contain variable number containers to produce 20 slides

Reduce Steps

60% time reduction

= FASTER & Fewer Defects

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Process Changes

Organization

- 5S exercise, Weekly Discipline

"We know from the changes that have already been brought about that far greater changes are to come, and that therefore we are not performing a single operation as well as it ought to be performed "
-Henry Ford

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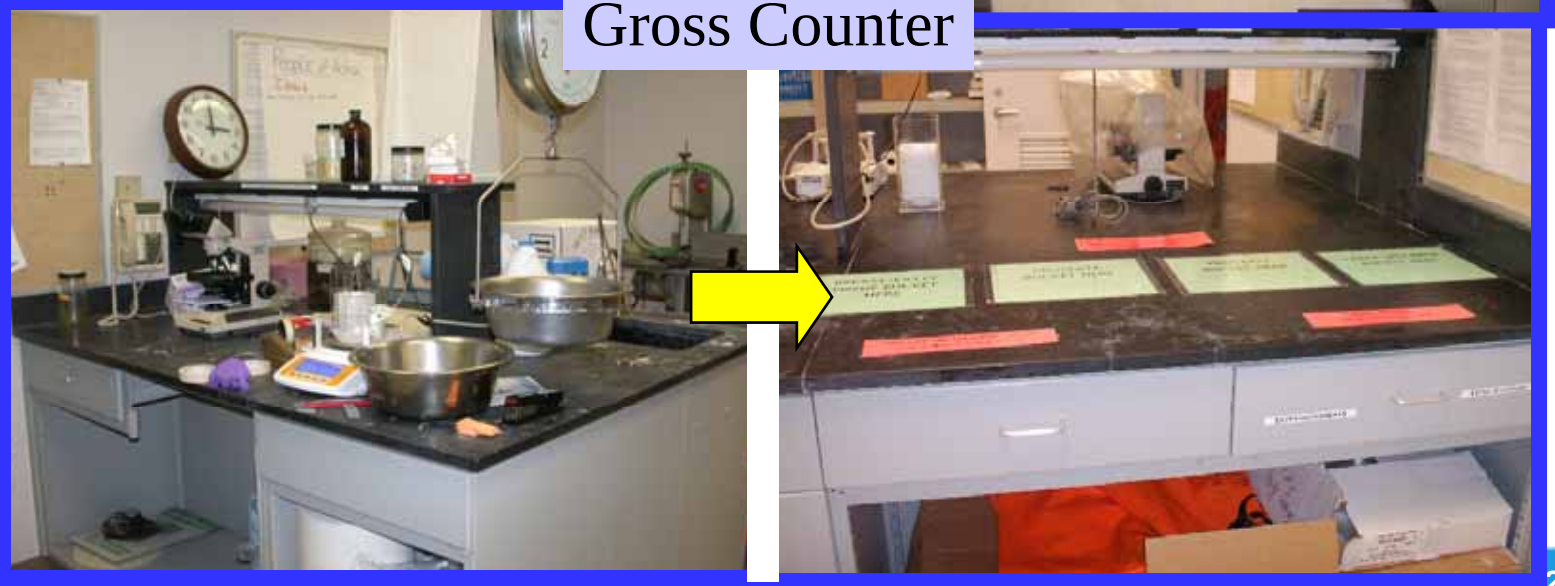
-Sort
-Set
-Shine
-Standardize
-Sustain

Before → After 5S

Accessioning Station

Gross Counter



Process Changes

Standardization

"My theory of waste goes back of the thing itself into the labour of producing it."
-Henry Ford

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Production Re-Design Successes

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Work Sorting

Workstation

Visual Controls

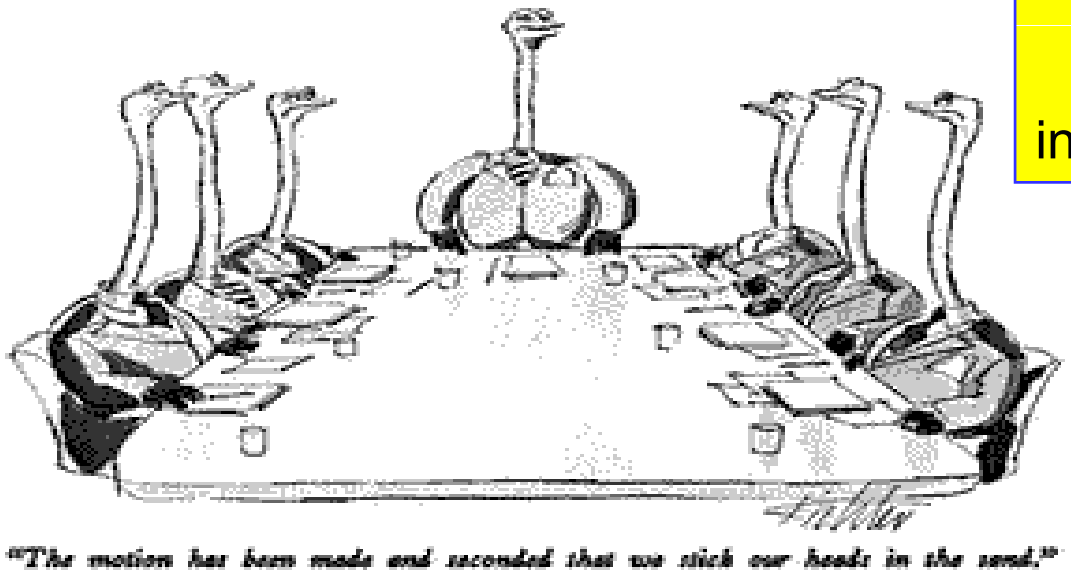
Work Tasks

FIFO

Case Study – Meeting Expectations

- Defining production demand to meet customer needs

Is 95% 1-day biopsy turnaround time satisfactory to individual customers?



"The motion has been made and seconded that we stick our heads in the sand."

"The motion has been made and seconded that we stick our heads in the sand."

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The Work Stream

-Flow
-Type

No control

Surgical Pathology = tissue based diagnoses

Tissue specimens

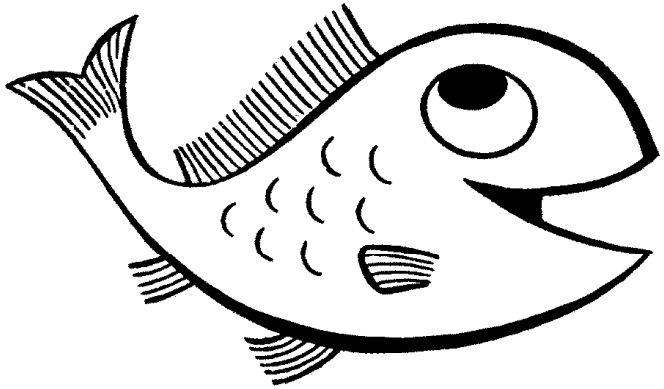
25% derm

RUSH

50% biopsies

Priority

24% large



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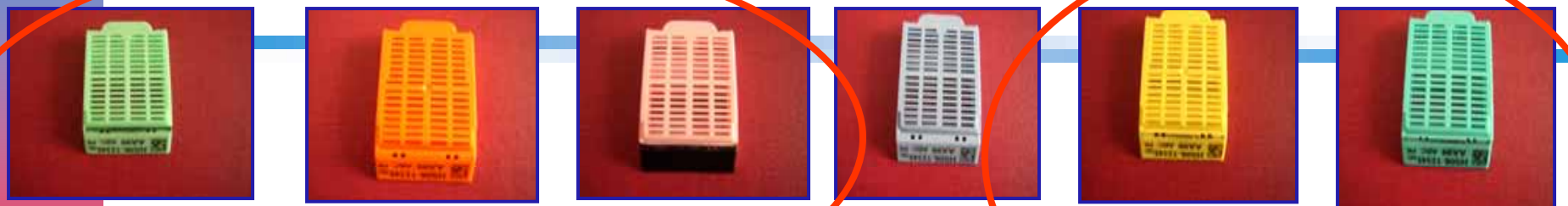
Fishing in the Biopsy Stream



Rush

SPECIALISTS

Kidney
Liver
Heart
Transplant

Priority Bx

SPECIALISTS

Lung
GI medical

POOL

Temporal artery
R/O Cancer, any

Routine BX

All other biopsies

SPECIALISTS

EndoBx
ENT
Oral
Prostate, VIP only

POOL

All other Bx

Larges

Derm
Plastics

SPECIALISTS

Breast

POOL

Needle
Core
Mammotome

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Color coded tissue cassettes identify - biopsy type & time priority & pathologist

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Prioritization by Customer Demand

Turn Around Times for Priority Biopsy Types

= current state

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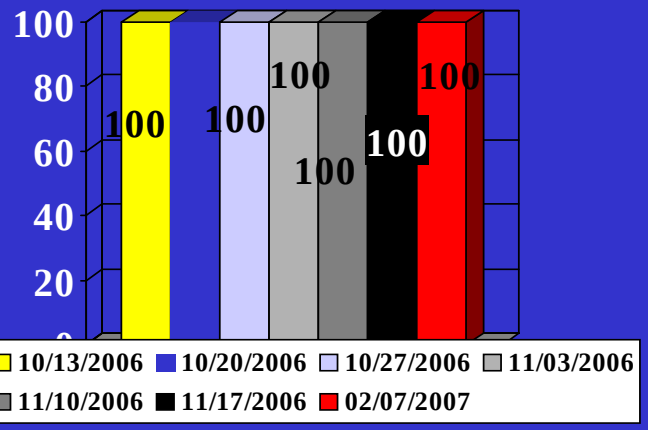
Heart

FEB 2, 2007

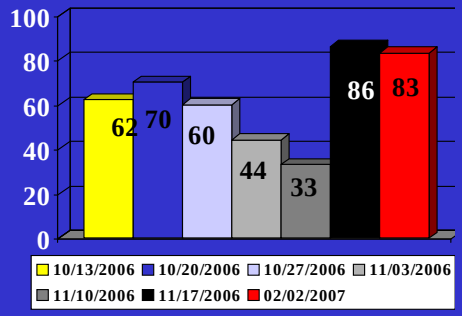
100% TAT within 24 hrs
(total specimens 24)



Lung

FEB 2, 2007

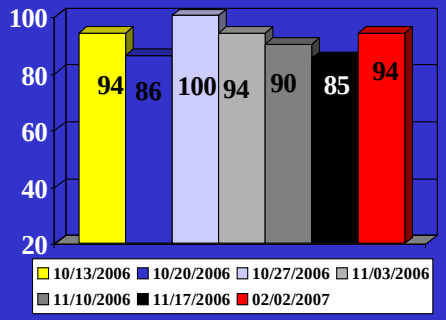
83 % TAT within 24 hrs
(total specimens 59)



Breast

FEB 2, 2007

94 % TAT within 24 hrs
(total specimens 125)



The progress has been wonderful enough- but when we compare what we have done with what there is to do, then our past accomplishments are nothing.
-Henry Ford

There must be a better way…

"Really, I'm fine. It was just a fleeting sense of purpose—I'm sure it will pass."

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Process Changes

Developing People

"The Henry Ford Production provides the fertile ground for self growth and breeds our next generation of leaders."

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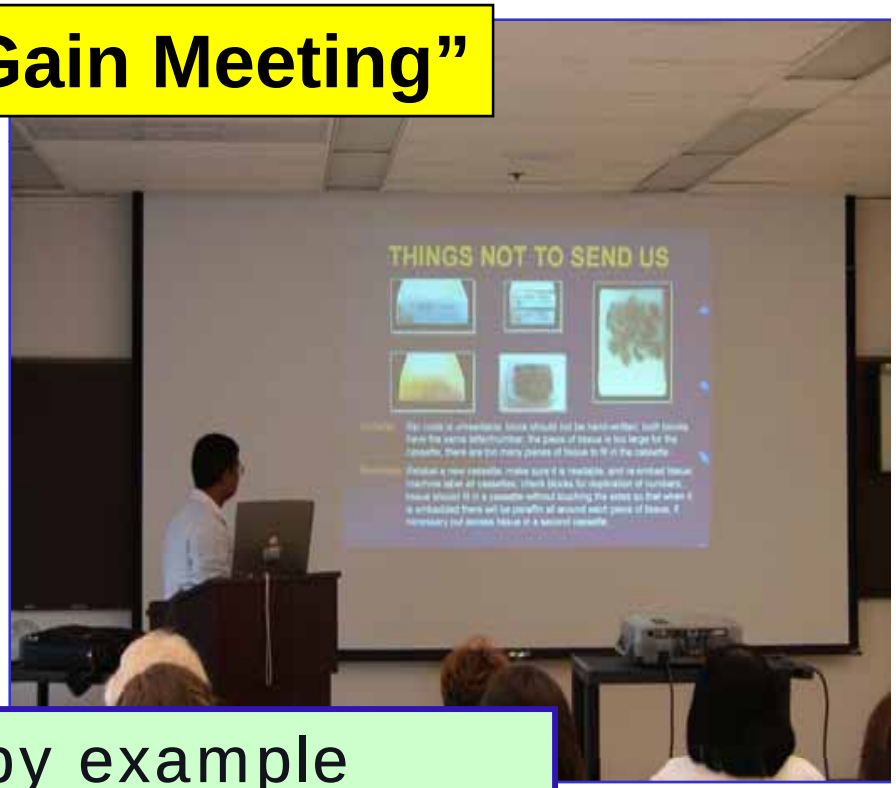
- Monthly HFPS Group Meetings
  - Share successes/failures
  - Spark enthusiasm
  - Set continuous expectation
  - Develop staff

“Share the Gain Meeting”



Teaching by example

Empowered Teams - Recognition & Reward

Spotlight Team of Month

Cheryl Neuman, Maria Gainer, Barbara Dionsi, Connie Shepard and Cassandra Parham

Successful Process Improvements March-May 2006

- 5 s in the Gross Room
- Accession Leveling
- Standardization of Outside
- Printer at scanner
- Cross Training to cover frozen room
- Protocol Standardization
- Standardization of specimen holding buckets
- Standardization of flags in CoPath
- Standardization Flag Reporting
- Specimen flag training
- Standardize placenta template
- Standardization and redesign of rehab missing information labeling
- Participation of MIS ID project
- New container labeler in Gross Room
- Standardization and revision of lab tags
- Standardized work procedures
- Standardization of scanning tags
- Standardization of requisition form process

Target Cards

Pizza

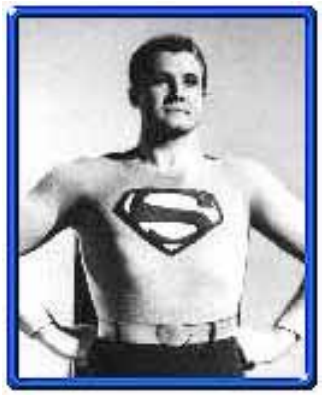
Standardization Meetings

Teamwork

"Coming together is a beginning, staying together is progress, and working together is success"
-Henry Ford

"One's workers ought to be one's own best customers"

-Henry Ford



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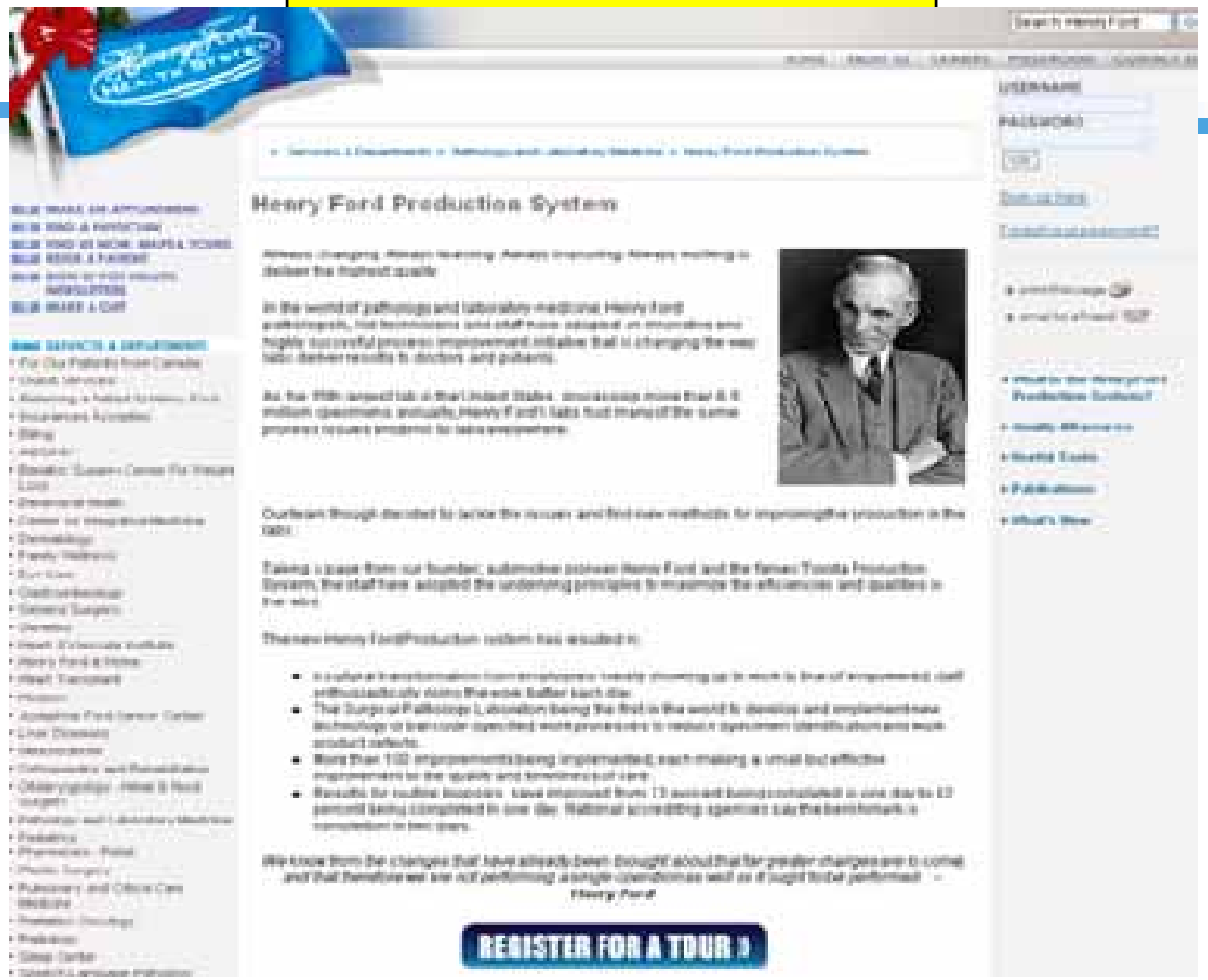
HFPS WEB PAGE



http://www.henryford.com/pathology

http://www.henryford.com/HFProductionSystem

Publications

The American Journal of Clinical Pathology

Transforming to a Quality Culture: The Henry Ford Production System
AJCP 2006; 126 (Suppl1) S21-29.

The Henry Ford Production System: Measures of Process Defects and Waste in Surgical Pathology as a Basis for Quality Improvement Initiatives
(AJCP 2007 in press)

The Henry Ford Production System: Effective Reduction of Process Defects and Waste in Surgical Pathology
(AJCP 2007 in press)

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New Technology

Code 128

Data Matrix

Symbology	Worst Case	Best Case
DataMatrix	**1 error in 10.5M**	**1 error in 612.9M**
Code 128	**1 error in 2.8M**	**1 error in 37M**

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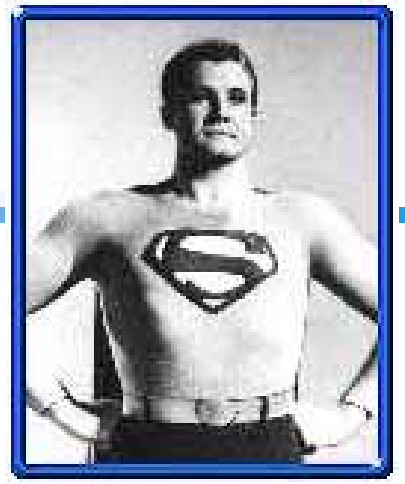
No Kryptonite Solution



Technology

Wont solve process design problems,

it will just complicate them.

-Mark Tuthill

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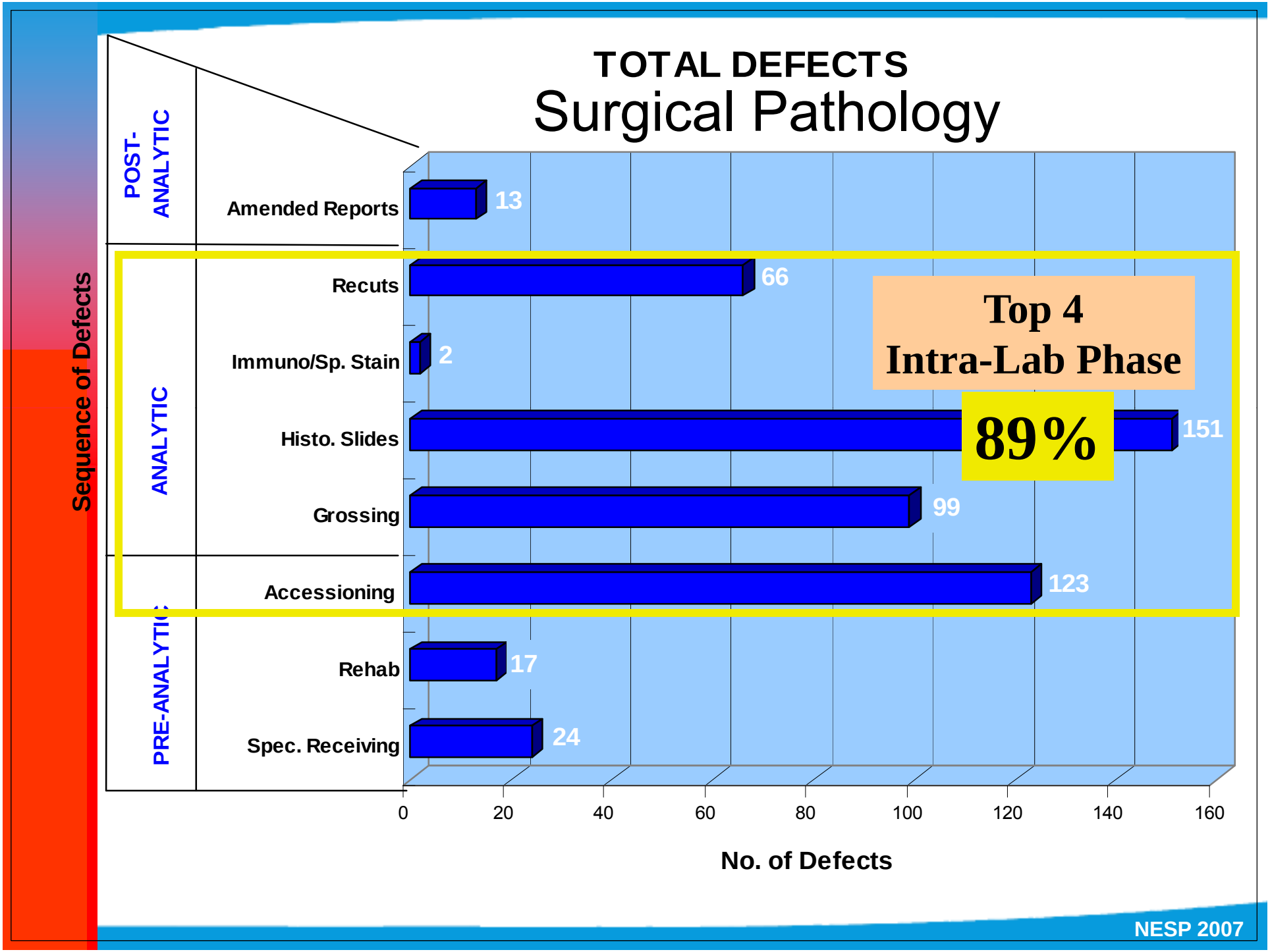

Results

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Mis-IDs arising in analytic phase of Surg Path processes

45 defects
45 cases

Process (number defects)	Blocks N=8,776	Slides N=14,270	Specimen Parts N=4, 413	Cases N=2,694
Accession (10)				
Lab Tag				
• Case number				2
• MRN				1
• Name				1
• Part Type				2
• Laterality				1
Tissue Site				
• Container				1
• Manual Block tissue site label				1
Recut Slide Labeling				1
Gross Exam (3)				
Block incorrect	3			
Histology (30)				
Block incorrect	2			
Pencil Slide Label		2		
Affixed Slide Label		26		
Case Sign Out (2)				
Ping Wrong Slide		2		
Total = 45	5	30	0	10
Sigma Value	4.7	4.8	4.5	4.3
DEFECT RATE	0.57%	0.21%	0%	1.67%

Root Cause

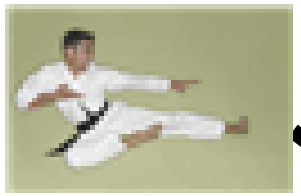
67% slide labeling

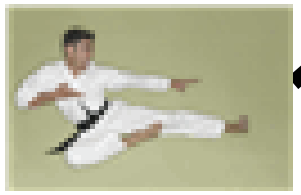
+ blocks = 78%

HFPS

- Biopsy/Label
- Transport
- Accession
- Tissue Gross Exam
- Processing
- Embedding
- Cutting/ Slide Label
- Staining/Cover
- Case Collation
- Delivery
- Microscopic Exam
- Stain/Recut Order
- Dictation
- Transciption
- Report Signout

Patient & Sample Identification



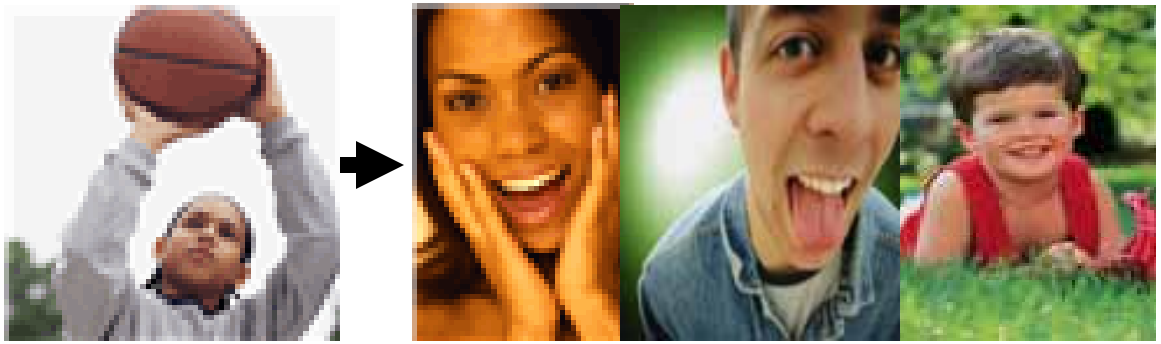


SP processes at risk of mis-identification error

HFPS

- Biopsy/Label
- Transport
- Accession
- Tissue Gross Exam
- Processing
- Embedding
- Cutting/ Slide Label
- Staining/Cover
- Case Collation
- Delivery
- Microscopic Exam
- Stain/Recut Order
- Dictation
- Transciption
- Report Signout

Patient & Sample Identification



SP processes targeted by barcode to reduce human labor and mis-identification error

Process Changes

Technology innovation applied to root causes

"Your methods are formed by what you are trying to do; they do not determine your purpose. To my mind it is starting wrong to put methods ahead of purpose."

-Henry Ford

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Process Redesign

The Electronic Kanban

Bar code specified

Work Processes

- (what do I do next)

&

Maintain Identification

- Name
- Numbers
- Specimen parts
  - Blocks
  - Slides

HFPS

Kanban

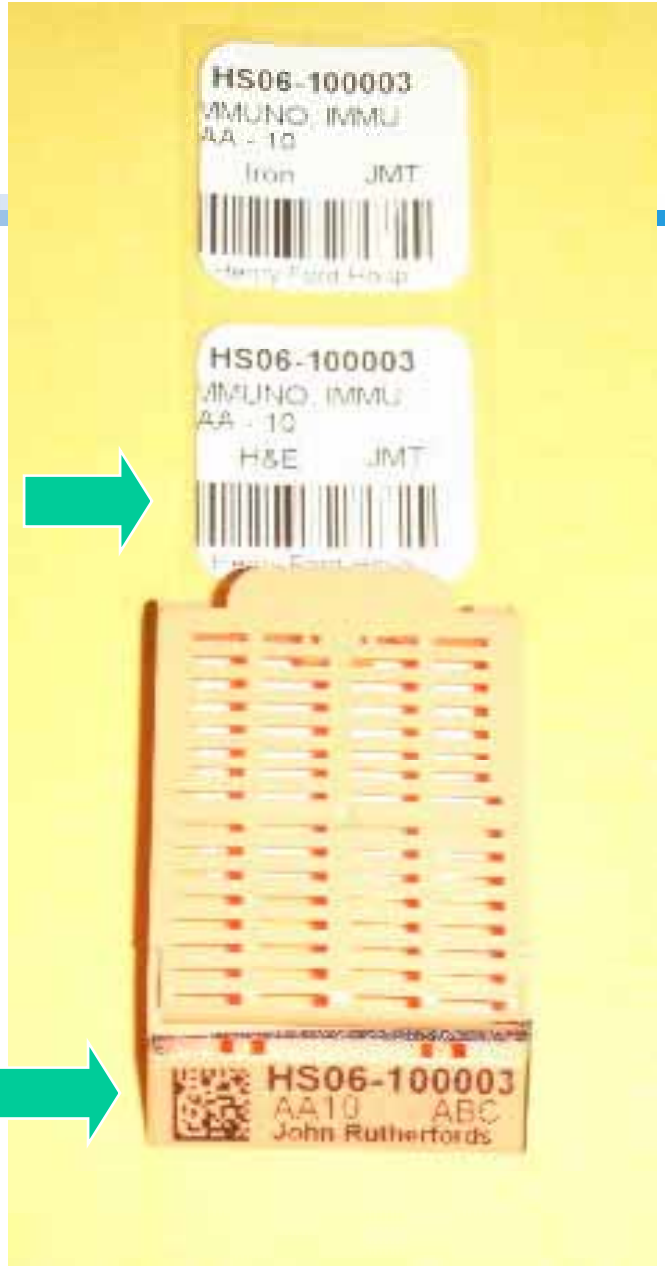
- *'Card' or 'sign' in Japanese*
  - Attached to in-process inventory
  - Communication and visual control system
  - Many types to control flow and production
  - Eliminate overproduction waste
- Bar code specified work processes in AP
  - Define & Standardize Work, Pathways, Connections
  - Minimize process errors in creating defective products

HFPS

Bar Codes in SP

- Maintain patient & specimen identity
- Specify & standardize work between workers
- Specified pathways & connections
- Define microtomy work, levels, stains
- Reduce batch mode slide labeling
- Eliminate manual error-prone steps, eg match slides and labels

1) CoPath interfaced cassette labeling
2) Chemical resistant just-in-time bar code specified slide label printing at microtome
3) Bar code specified case retrieval at Gross dissection and Pathologist signout



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Accession Station U-shaped Cell

CoPath terminal
Barcode label printer
  -Lab tag
  -Specimen containers
Lab tag scanner, bar code reader
Cassette etcher- 2D barcode

Microtome Station U-shaped Cell

CoPath terminal
2D Barcode reader
  -Individual cassettes
Slide label printer
 -Chemical resistant slide labels
 -Print 1 cassette not batch

Barcode Specified Surgical Pathology Workflow

HFPS

1 Create Lab Tag & Specimen Container Barcodes 2

Specimens

Accession

CoPath

Scantron Lab Tag Imager

Cassette Etcher 3
Create cassette barcode

Verify original Lab Tag & created barcode ID

Gross Tissue Cutting

CoPath

Tray

Scan container barcode to open case in CoPath 2

Verify created container barcode with CoPath and cassette ID

Histology

Scan cassette barcode 3

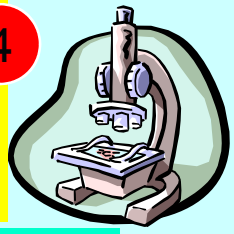
Microtome

Create chemical resistant slide labels by cassette barcode 4

Verify on cassette & slide SP# and pt. name with CoPath

Pathologist Signout

- Scan slide barcode to open case in CoPath & 4
- View scanned lab tag in ThumbsPlus 1



Verify patient name, SP # on Lab tag, slide and in CoPath

QUALITY

Its all up to you

Now get busy!

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NESP 2007

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Conclusion

"If we do that which is before us in the best way that we know, that is, if we faithfully try to serve, we do not have to worry much about anything else. The future has a way of taking care of itself"

-Henry Ford

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