The Seattle Children's Clinical Laboratory-Hospital Interactive Quality Journey:

Lean, Huddles, Improvements, ISO 9001, and More !

CONFAB 2016

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Date

ID slide only

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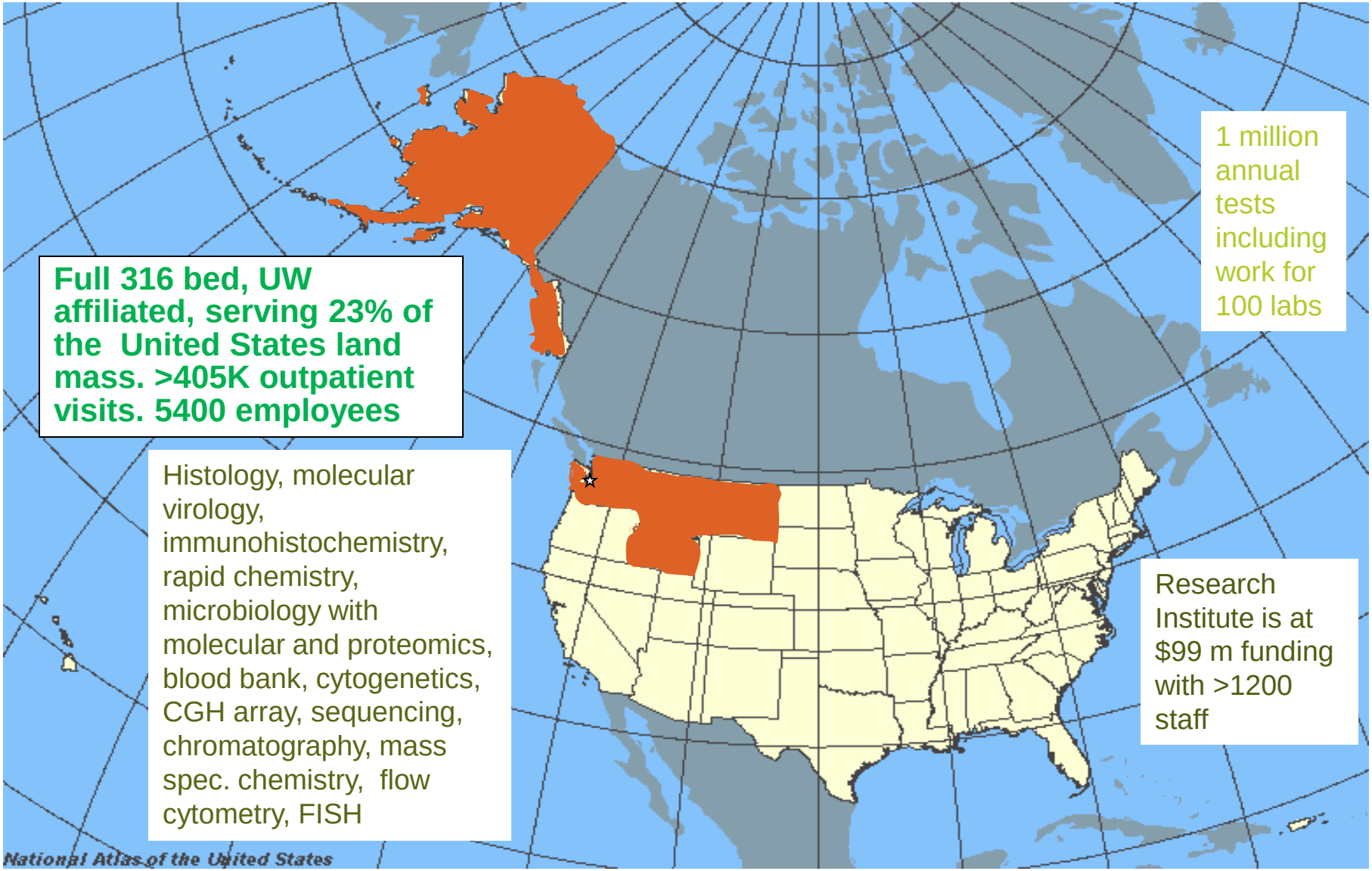
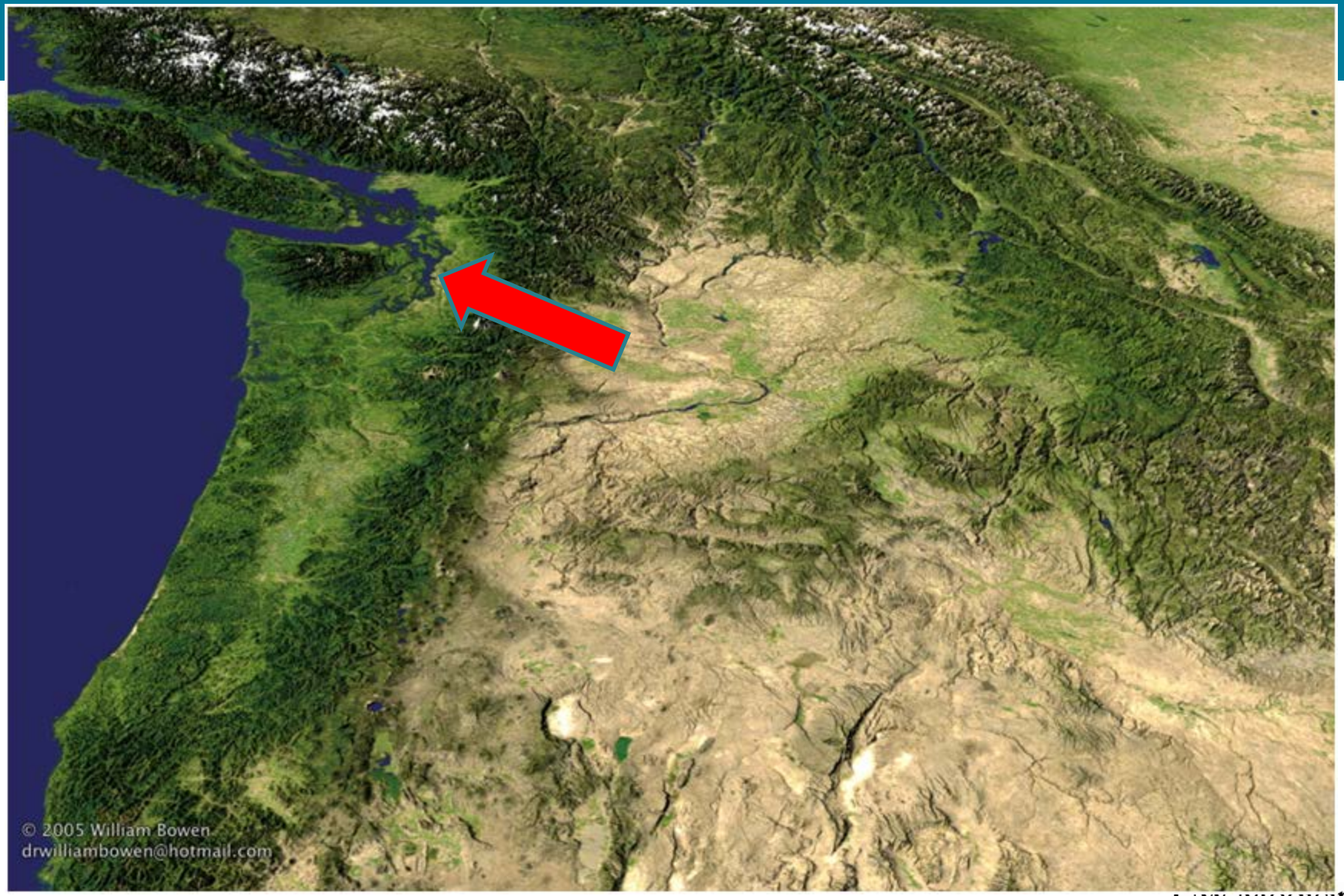
By Leading, the Laboratory Can Gain Resources (hospital or corporate) For the Work.

- In the beginning
- Hospital-Lab lean philosophy
- Laboratory journey
- Value stream breakthrough
- Facility design
- Daily management
- Check-act in the hospital
- Lessons learned
- Next steps

Hospital and Lab serve specialized needs in a broad geographic area



Seattle



Community contributed to our work

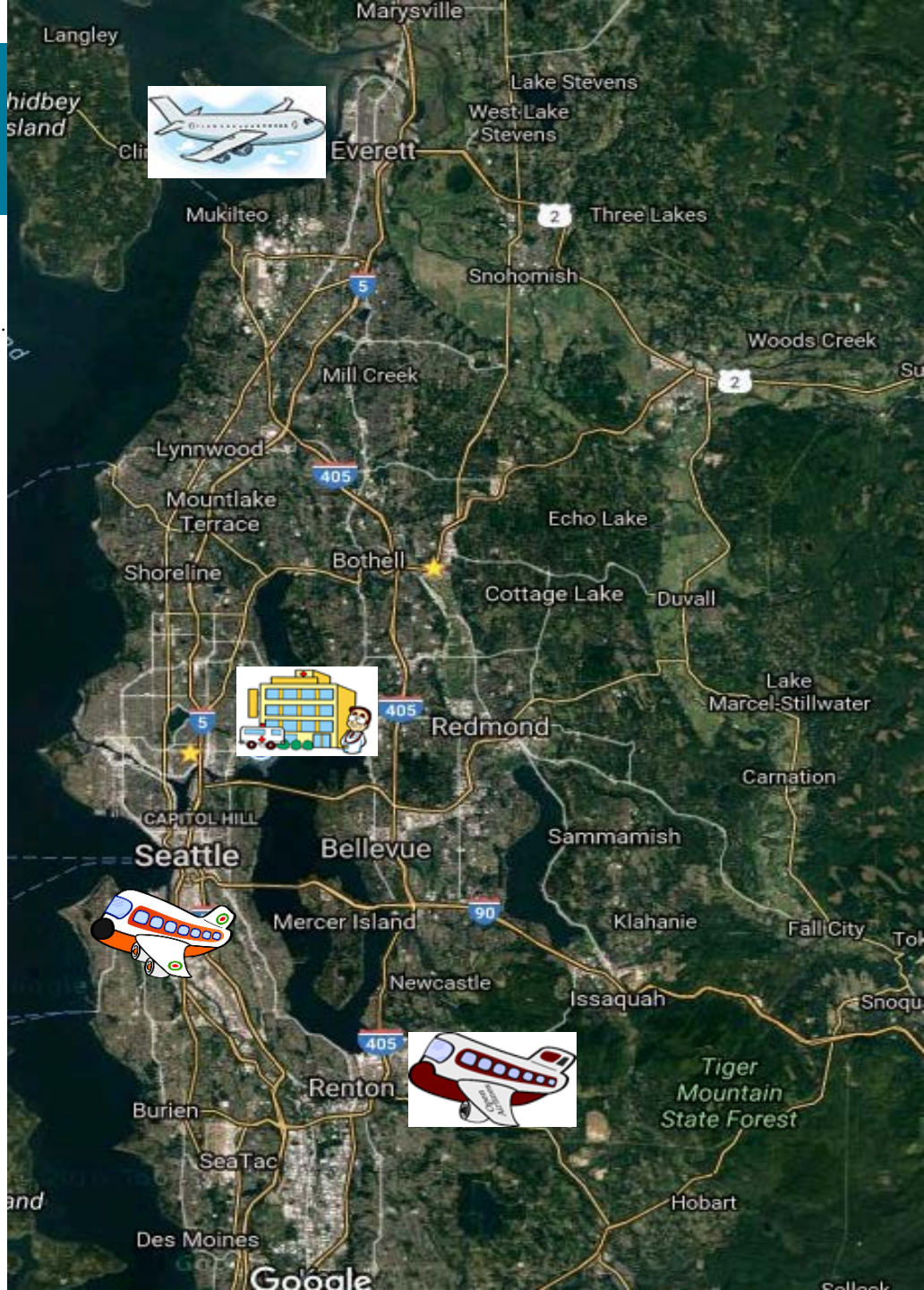
Boeing 1990's.

Boeing engineers saw frustrations in health care.

Consultants spun off from Boeing

Virginia Mason Hospital adopted Lean

Our lab engaged Valumetrix ; the hospital began with Joan Welllman and Associates



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- *SCH: on the journey over 15 years*
- *Transformation for hospital—*
  our improvement system
- *Clinical Laboratory—stay on the leading edge*
  - *first major project 14 years ago, front end*
  - *Lab has helped hospital*
  - *One lab supervisor to CPI office and new career*
  - *One consultant embedded in lab*
  - *Matured in thinking*
  - *Moved work from top down to bottom up*

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Our CPI Approach

- **Leader guidance and direction:**
  - This is our management system.
  - This is journey to continuous performance improvement.
- **Staff (and family) participation:**
  - this is how we will improve & staff are partners & will lead
  - scientific method applied to our work
  - Listen to the patient / family
  - No Layoffs
- **Understand the sequence of work:** map the process
- **Identify waste:** reduce or eliminate it

Hospital and Lab Lean Tools: training and structure came to us free

- 5S—what we all need to do
  - Sort—throw out what's not needed
  - Straighten—get every thing left into a designated place
  - Sweep & Shine—keep it clean and orderly
  - Standardize work stations and equipment
  - Sustain—most difficult
- Rapid Process Improvement Workshops, process design
- Inventory---simple systems to reorder
- A3---simple way of attacking a problem with RCA and insuring you sustain via metrics
- Metrics---measure what matters e.g. TAT
- Visual Controls—all can see what is happening, huddles
- Staff directed Improvements

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SCH CPI System Gave Us Standards & People for Workshops

- Dedicated office >40 individuals, > 50 week long workshops /year
- Top down buy-in, training, & involvement
- Conversion of medical and managerial staff to LEAN
- Continued focused workshops to achieve higher quality
- Value stream mapping for programs
- Lots of positive results to convert all staff
- Sustaining; new tools, employee evaluation, condition of hire
- **Using these resources gave us momentum**

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What part of the lab is like a factory ???
How do you deal with that ?

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Core Lab 7/24 Operation

- Took a cramped inefficient crowded area with many individual best practices all aimed to address critical clinical problems
- Developed a work cell with 5 S principles in place that was more efficient and seeks to eliminate “special handling”, disruptions, and individual non-standard work
- Major Reset of physical layout to juxtapose instruments coupled with single piece flow
- First in; first out

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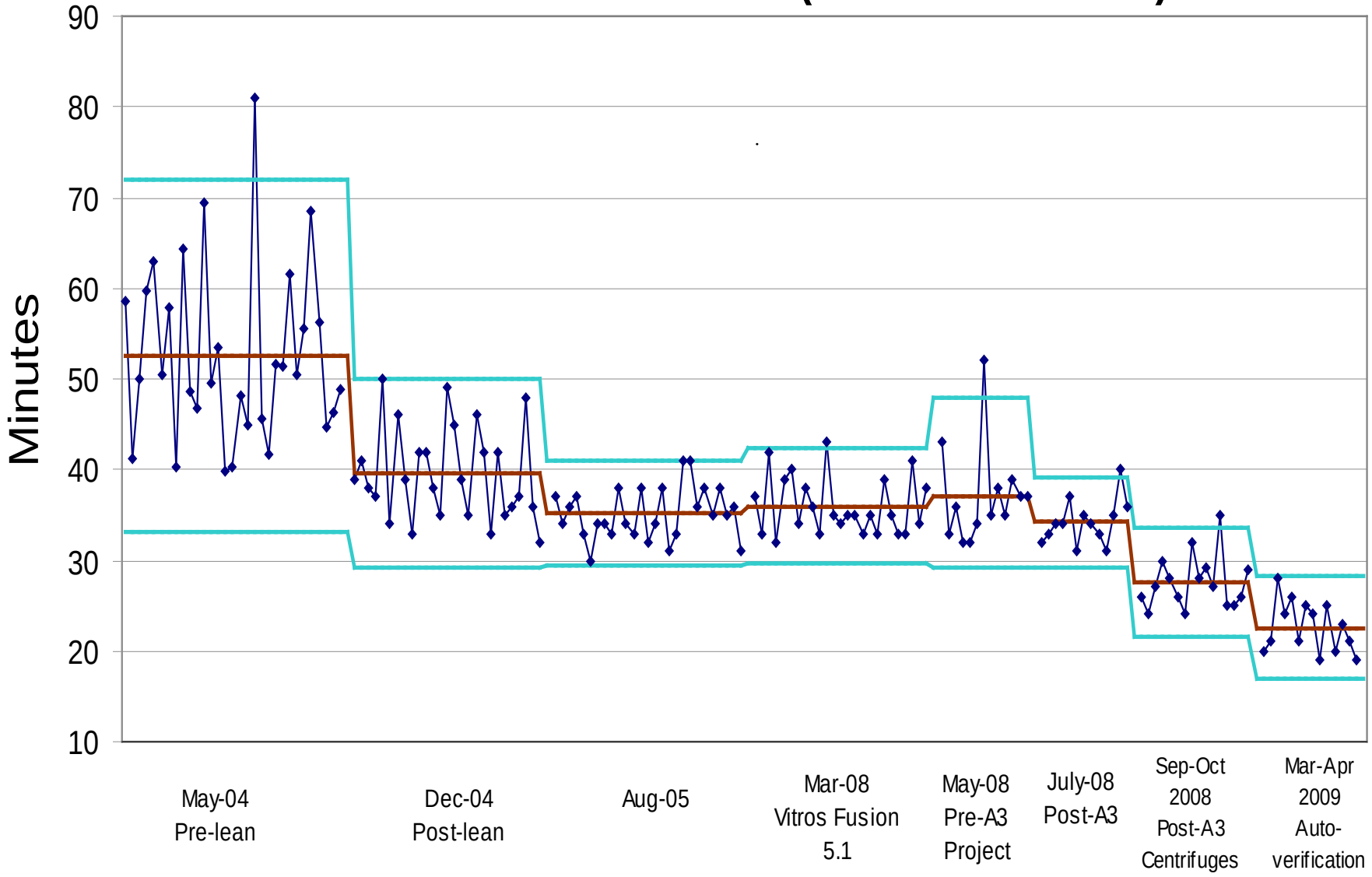
Creatinine Turn Around Times (Before/After Lean)



Daily Audit: TAT Measured as % Meeting Target

- Developed a workcell in our core laboratory in 2004 and eliminated stat testing—routines were performed faster than previous stats
- Gained capacity to grow (over 30 %) without adding equipment or technologists
- *Am J Clin Pathol.* 2010 Jan;133(1):24-31.

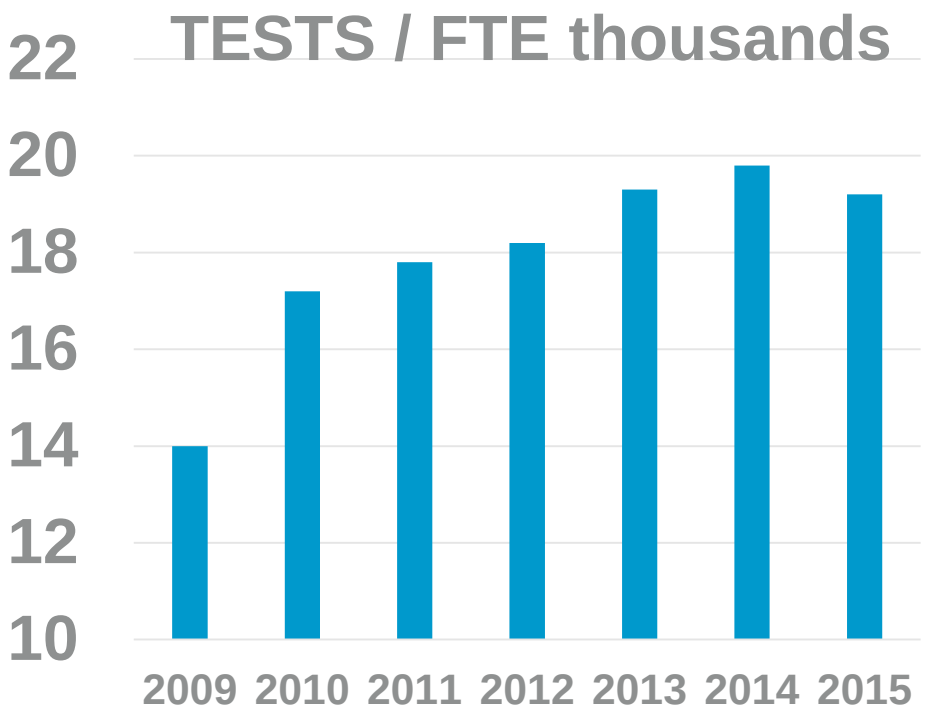
TEST	#	% < 1 hr.	Mean
CBC	228	99	17
Creat	183	99	22
Diff	206	89	32
PT	34	99	21
UA	44	98	20
iCa++	29	100	4
HCG	8	100	8
bOHB	2	100	42

Productivity increases overtime

- BEFORE: central processing lab assistants had to prioritize: code, OR, NNICU, ICU, ED, Hem-Onc clinic, everyone else.
- Promised STAT TAT 1 hour

STATs at 60 %

- LEAN: first in; first out.
- Routine < 1 hour
- STATS became history
- Productivity rises



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Autopsy report turn around time reduced to 30 days (from 64) by pathologists

- 3 day workshop with faculty, assistants, administrative admin.
- Notebook for each case with sections for each component
- Tracking board—events on pathologist Outlook calendar, i.e. time reserved
- Each section is scheduled, completed at a set time and proofed
- Presentation to colleagues at 2 weeks to check on synthesis
- Sustained 10 years—takes less time. Do once; do right.
- **Helped to engage pathologists who participated in more work**
- **Arch Pathol Lab Med. 2009;133:1932–1937)**

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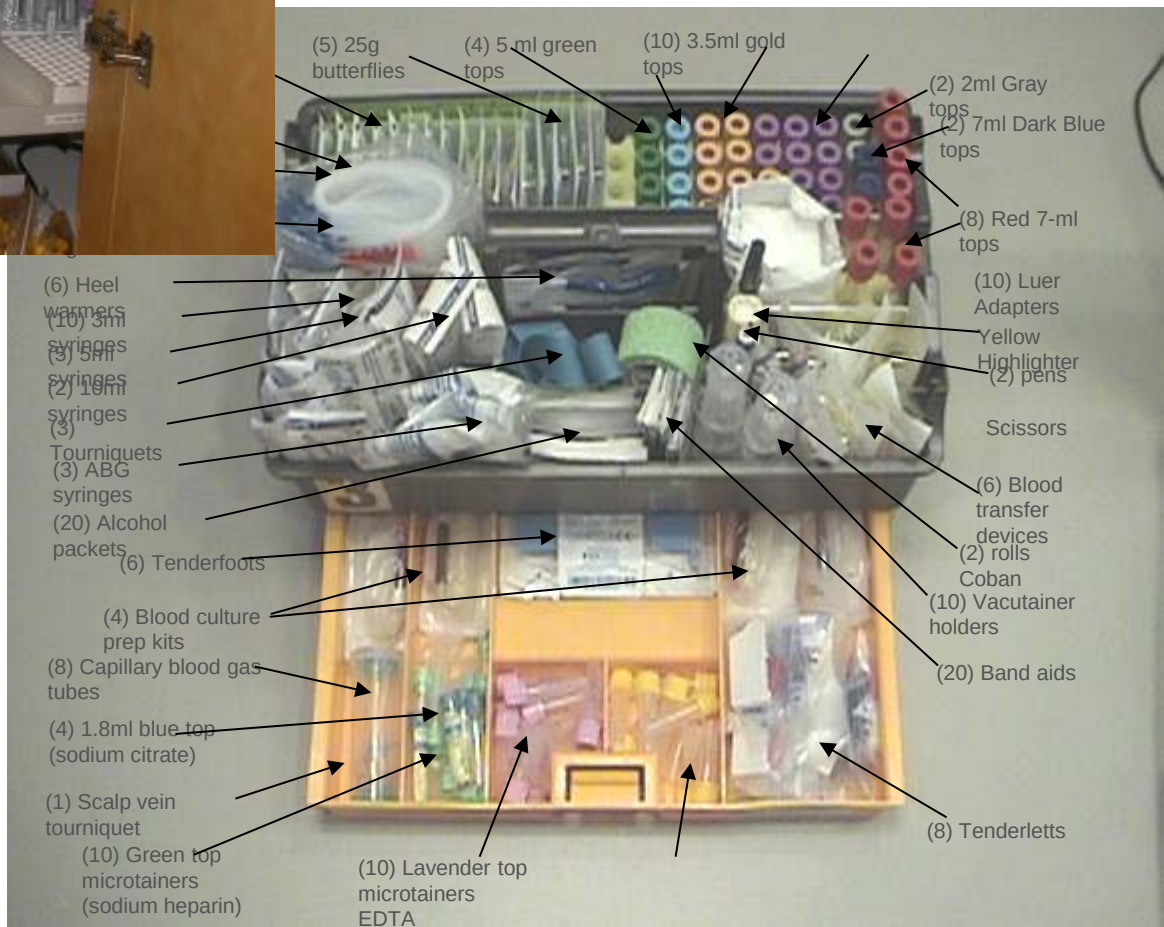
Inventory and standard equipment….why bother ?

- What happens if you don't have to do inventory every week?
- What if your supplies appeared as needed?
- What if your supplies were not expired (have any of those)?
- What if all equipment were set up the same so that each tech did not have to spend time customizing ?

Kanban Inventory System: reduced inventory 41 %, removed person counting weekly, prevented running out



Standard Work With blood Collection tray- 22 individual to 6 identical, Standard trays

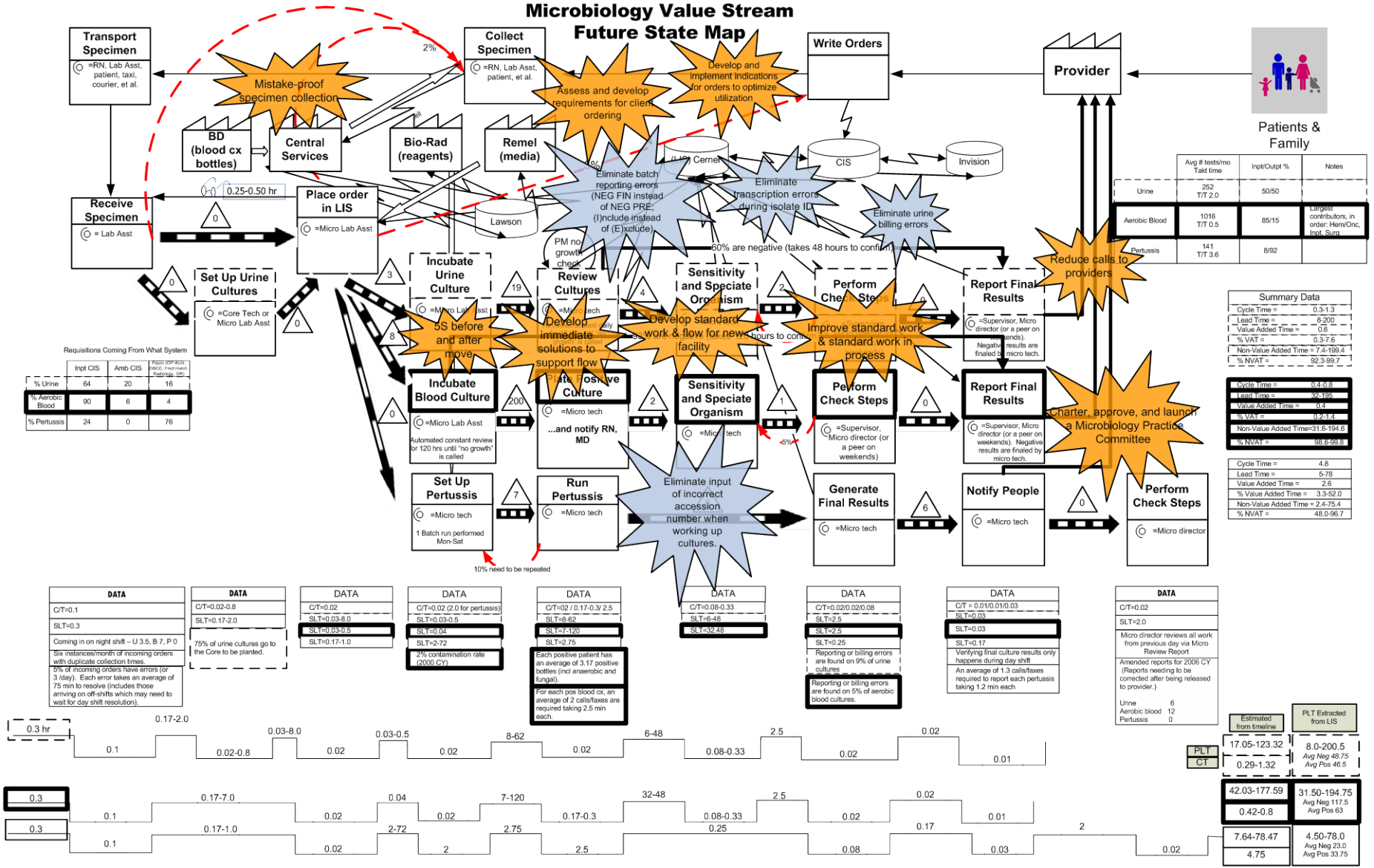
All hospital inventory is now in one Kanban system managed by supply chain.

- Kanban concept from phlebotomy to hospital.
- All hospital supply are in a two bin, Kanban system managed by our supply chain.

But what about big projects ??

- Incremental improvement can best occur on the backbone of a well-define process
- In which all the workers are performing standard work
- Big project: value stream map, understand the big picture, break into small projects, measure improvements
- Focus value stream on the patient
- Value streams were a high profile hospital initiative—we were in first group

Microbiology Value Stream-an experiment at the hospital level—we were ready early.



Microbiology Value Stream
"No Culture Left Behind"

- MD talked to microtechs about how this would help patient and get them home sooner. Transformative!
- Medical advisory team:
  - *Reduction of bottle types from 3 to 2*
  - *Implementation of standard work around specimen volume to optimize recovery*
  - *Statement about dual site culture on positives from a line draw*
  - **Use of the hospital based value stream enabled change up and downstream**

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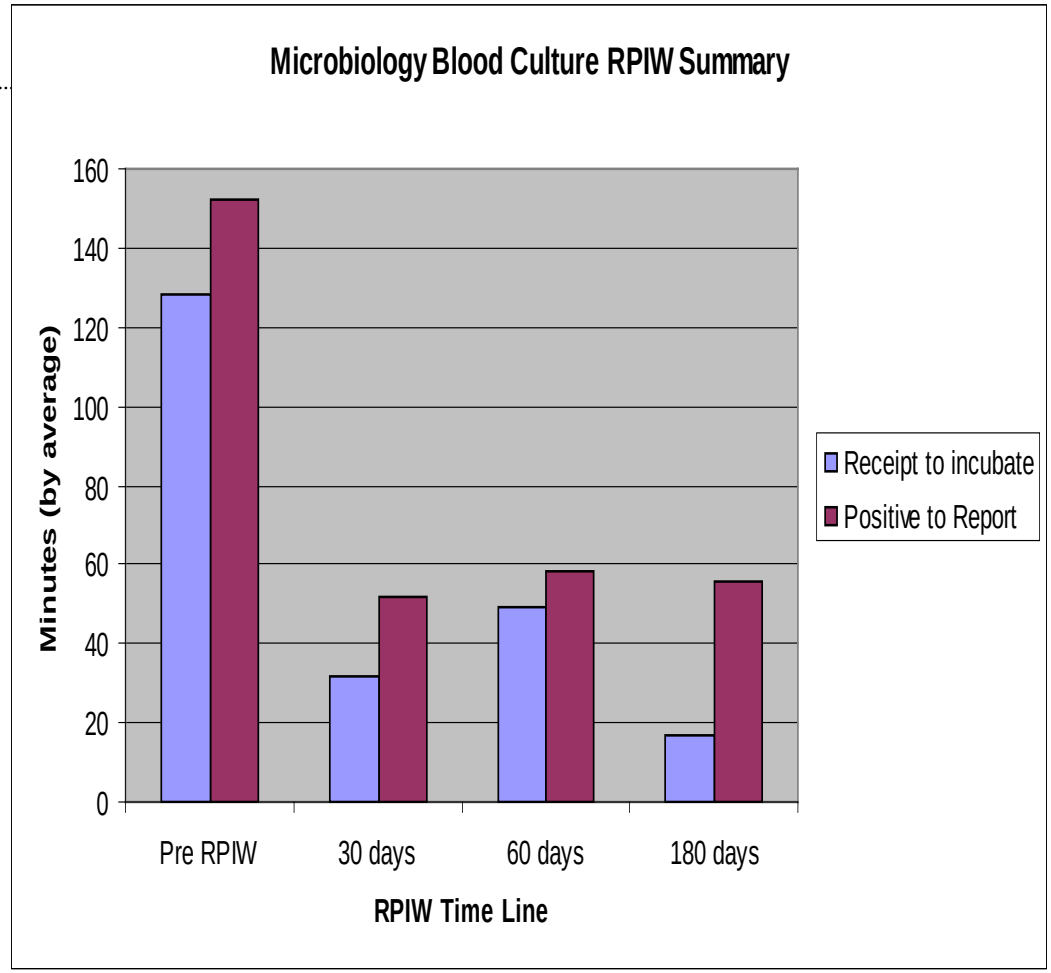
Microbiology Value Stream
"No Culture Left Behind"

- No microbiology night shift =
  - No cultures to incubator
  - No resulting of positive cultures 11pm-8am
  - Lots of telephone calls
- Trained night core techs in both tasks
- "Added statement when putting in incubator: cultures are monitored continuously and you will be phoned if positive"
- Brought in microtech at 4 am
- MD's made night antibiotic changes

Patient Oriented Blood Culture Was Foundational

- Sustaining blood culture response time
- Culture work-up expanded to include night shift
- Created reporting scripts
- Education on collection volumes
- Modification of CIS orders



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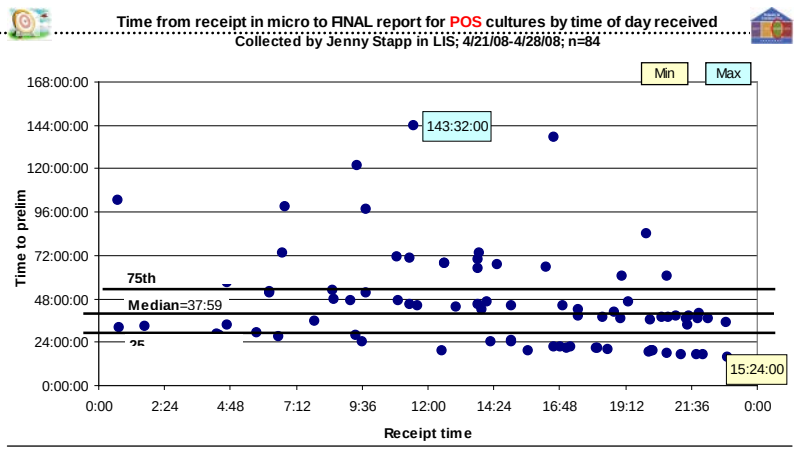
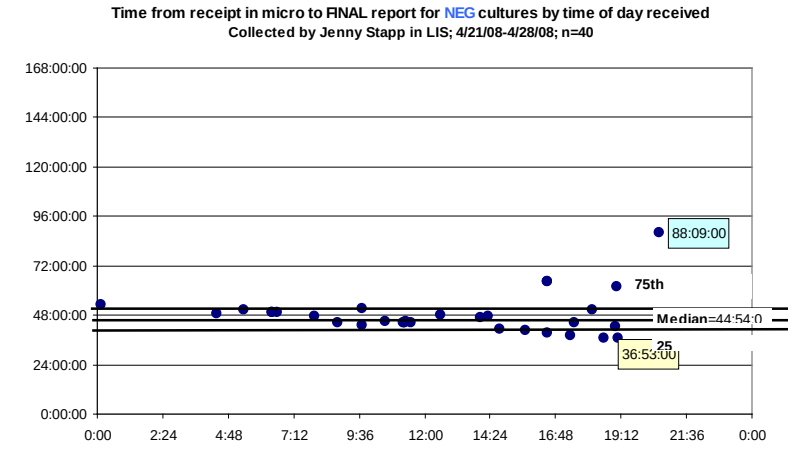
Urine Culture work changed clinical guidelines for discharge

- Focus:
  - Standardize urine culture procedures
  - Reduce batching and variation
- Goals:
  - Reduce the variation in lead time so that 80% of cultures have a preliminary report in 24 hrs.
  - Reduce the variation in lead time so that 75% of POS cultures and 80% NEG cultures were finalized in 48 hrs.
  - Reduce percent of final reports returned for rework by 50%





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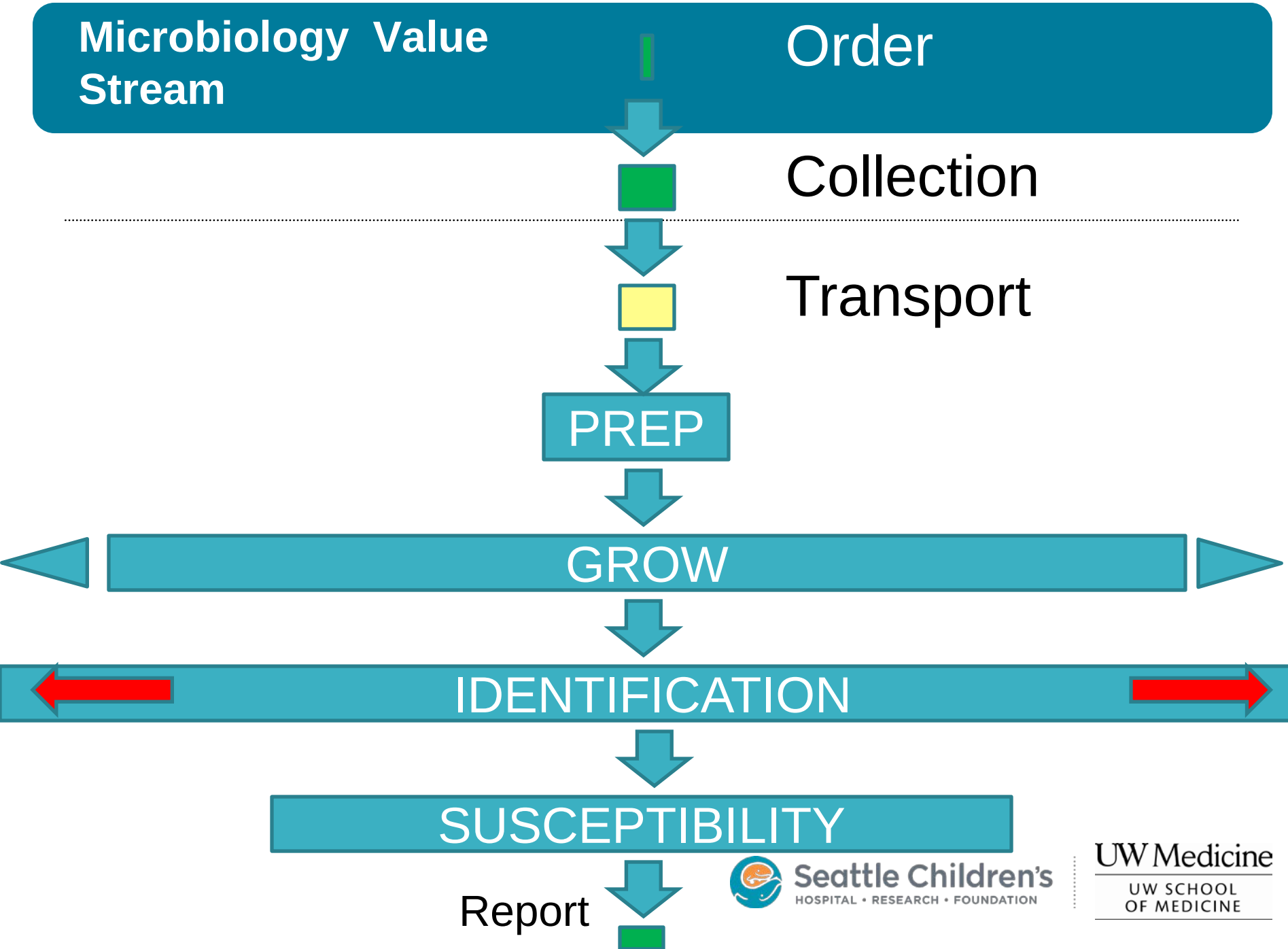
Microbiology Value Stream
Order
Collection
Transport
PREP
GROW
IDENTIFICATION
SUSCEPTIBILITY
Report
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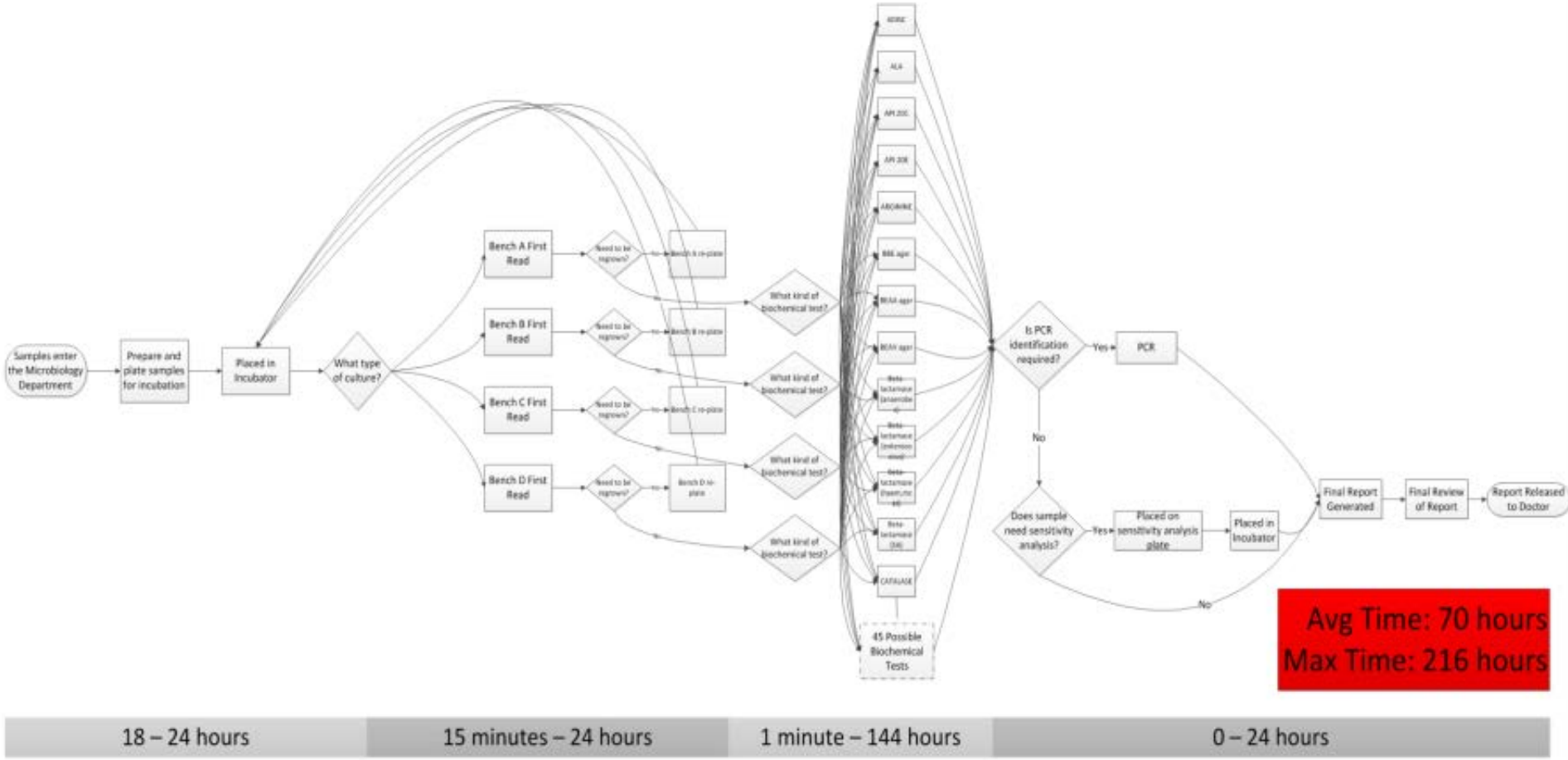
Mass Spec in Micro- Not just identification

- When does the patient want their results ?
- Prior work on blood and urine cultures set the stage
- Capitalized on the education & culture change with micro techs .
- Add industrial engineering students to jump start project
- Small batches with culture read when colony appears
- To Mass Spec at set times q 4 hours
- Results to patients an hour later……organism ID !
- If we used the mass spec. alone, then we would speed but not as fast. Now at 7/24 staffing—it is what patient wants and what the techs designed.

Pre-MALDI Work Flow Map



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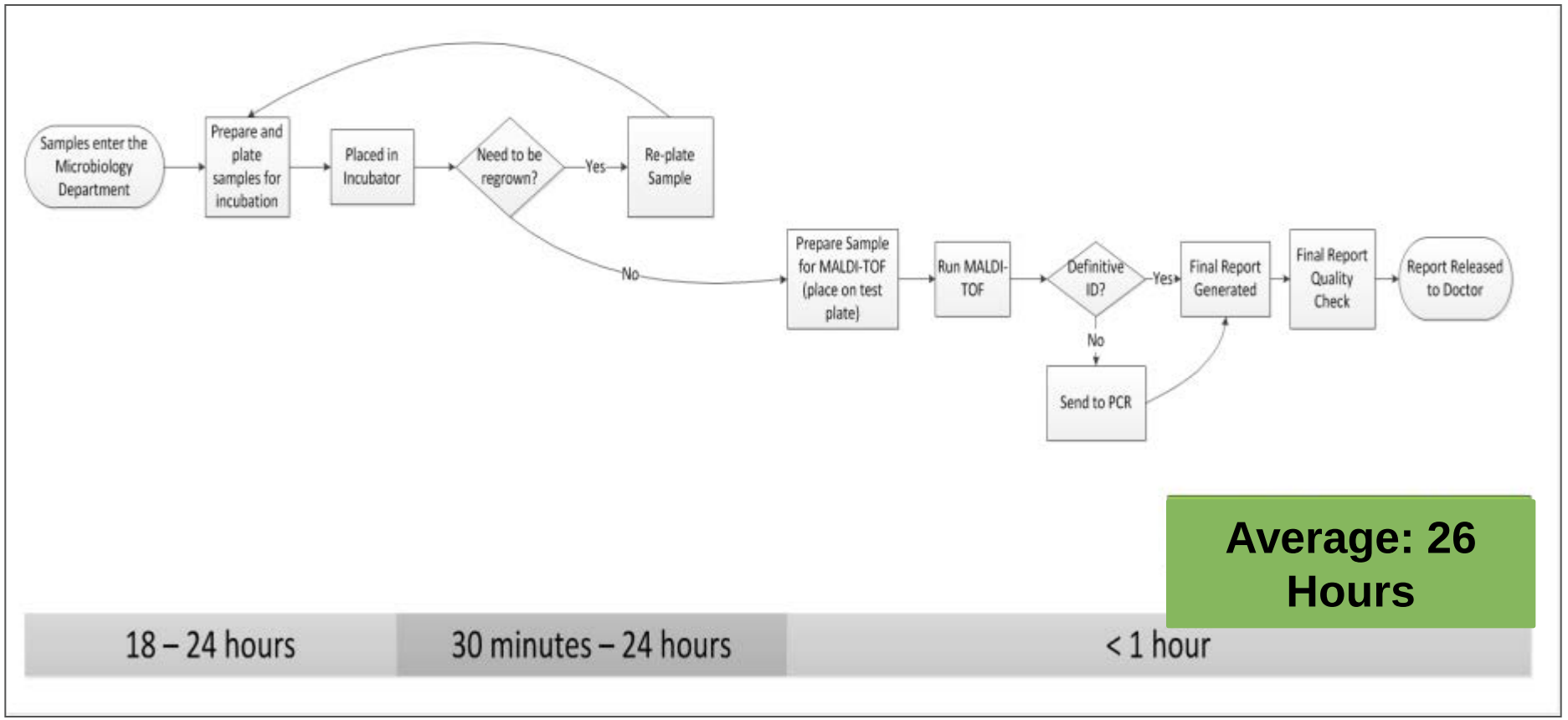
MALDI-TOF + Flow of cultures



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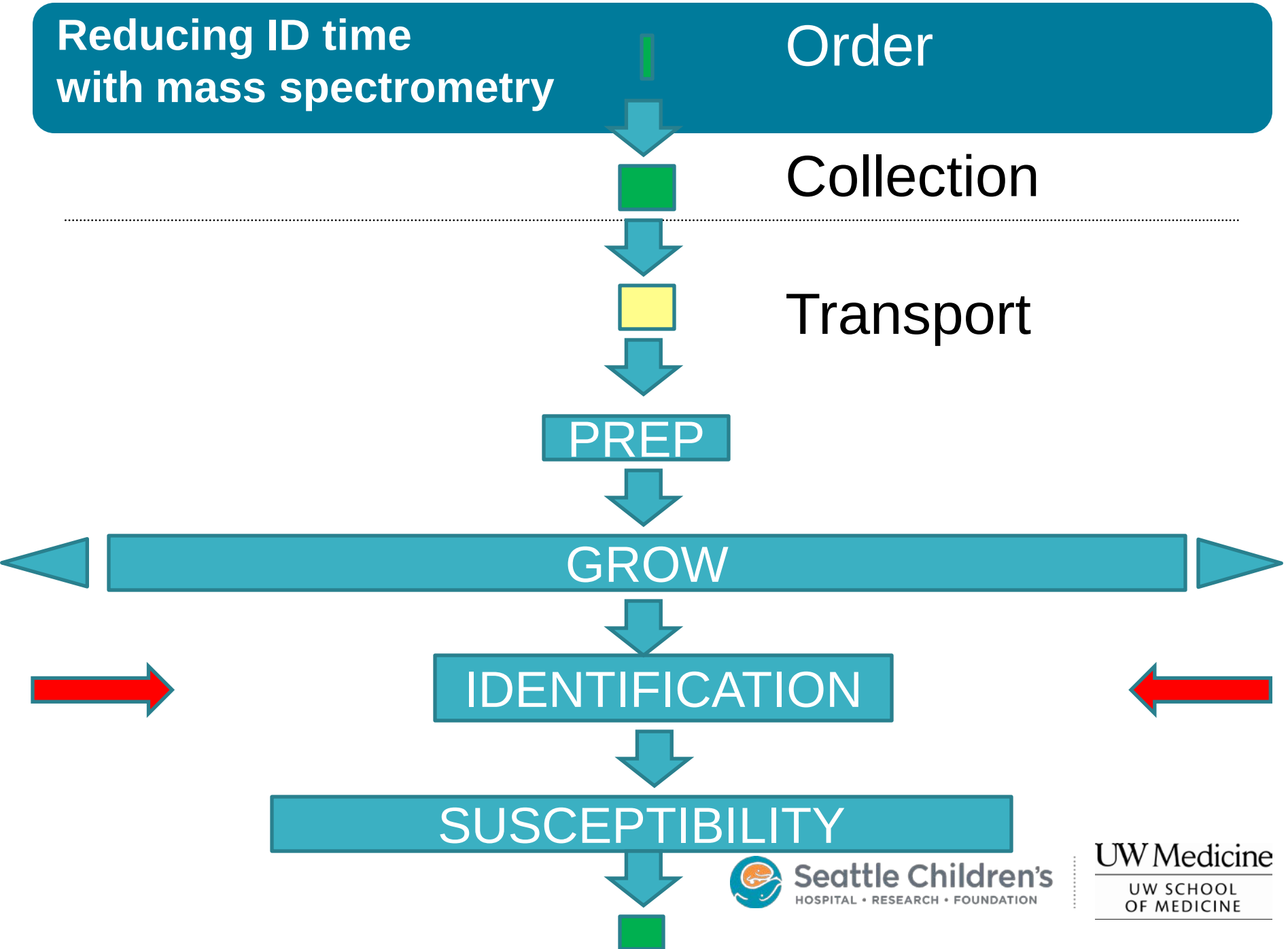
Reducing ID time with mass spectrometry



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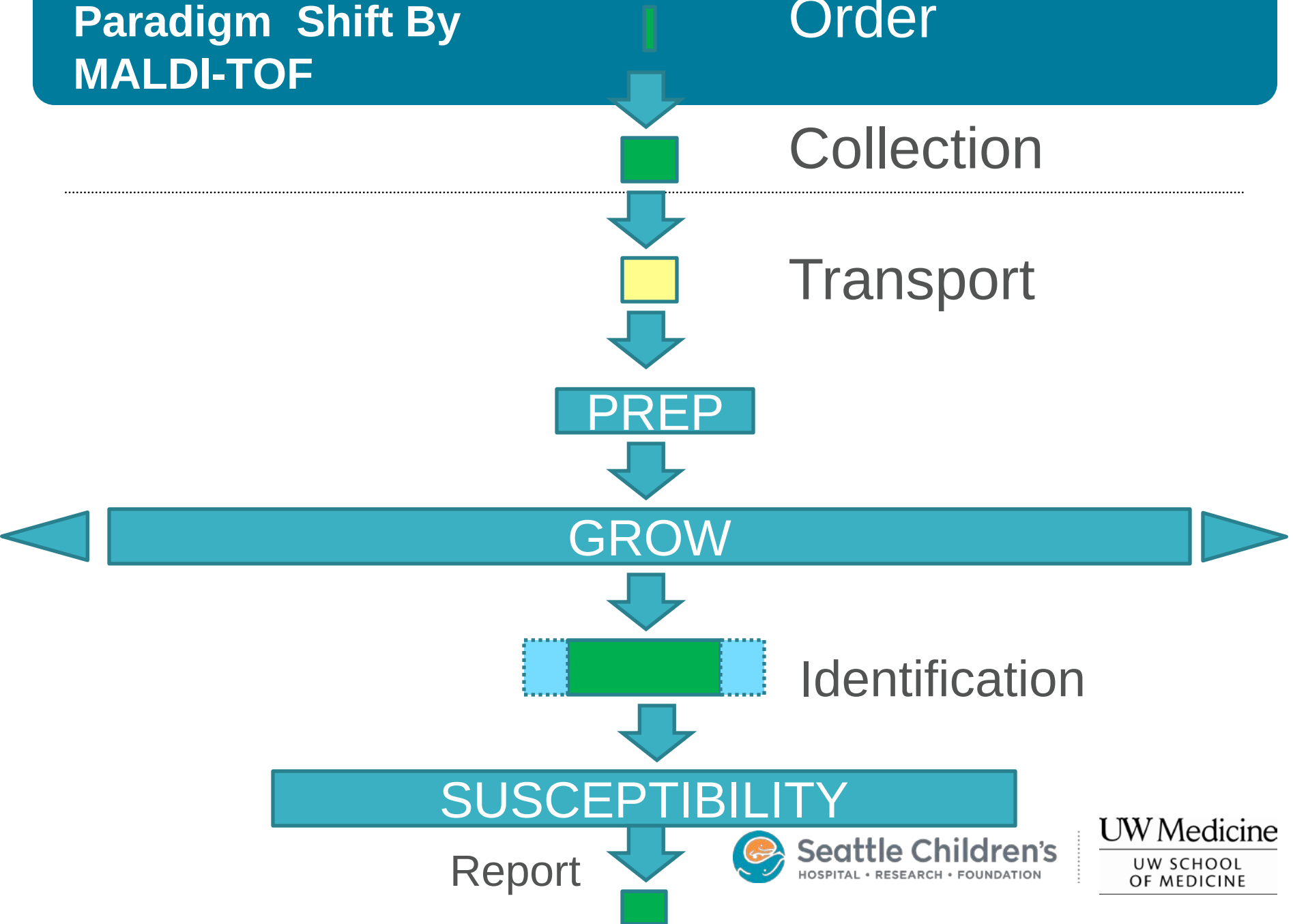
Paradigm Shift By MALDI-TOF



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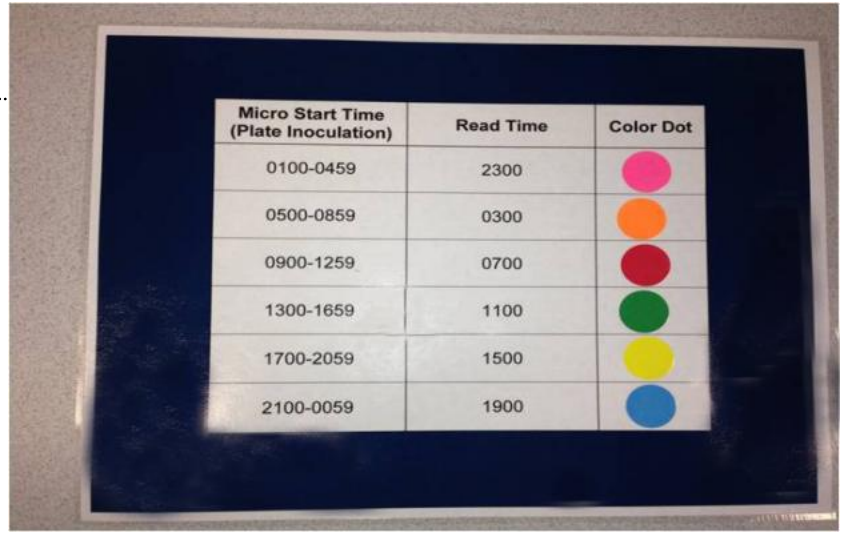
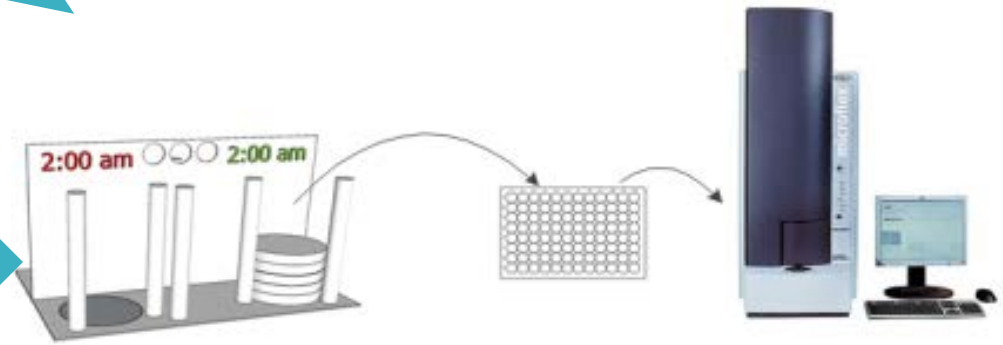
Culture Organization



Micro Start Time (Plate Inoculation)	Read Time	Color Dot
0100-0459	2300	
0500-0859	0300	
0900-1259	0700	
1300-1659	1100	
1700-2059	1500	
2100-0059	1900	



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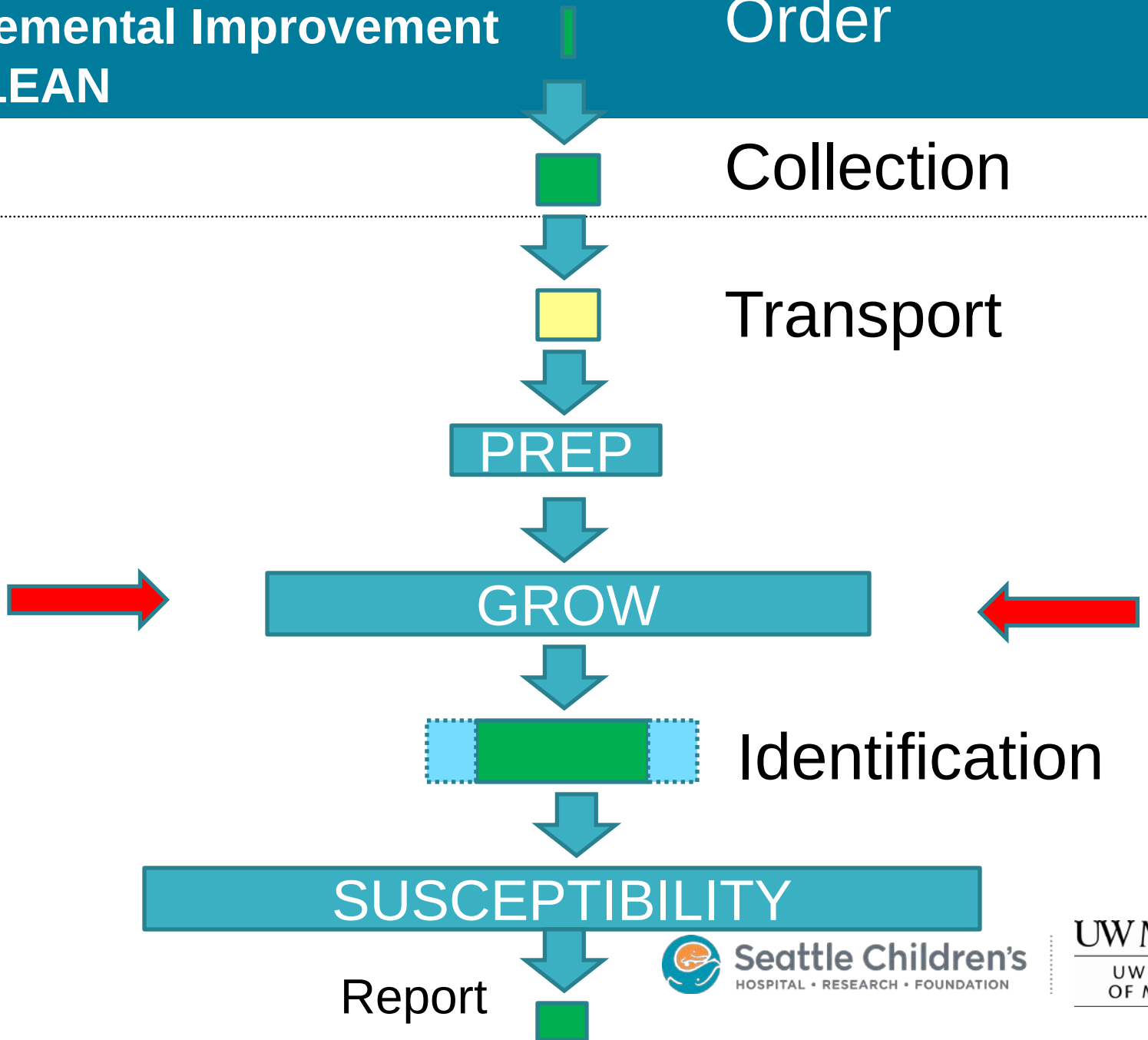
Incremental Improvement By LEAN



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Work Reorganization

BEFORE

- Benches for each culture types
- One tech per bench at 0800 daily
- Most work was addressed as one big daily batch
- A late afternoon read if the physician telephoned

AFTER

- One person processes a small batch over 1-3 hours
- Repeat with next small batch
- Physical layout changed

Convert from a lake to the flow of a waterfalls

Major Outcomes From MALDI-TOF And Workflow Changes

- Results to MD faster
- Reduced variability of result delivery
- Results are more predictable
- With predictable results, diagnostic and treatment pathways can be optimized
- **Lab impacts patient**

Process Improvements Benefits Patients, Hospital, & Lab

- **Faster**

- **Simpler**
  - Easier to train
  - Easier to audit
- **Fewer Steps**
  - Less chance for an error, higher quality, standardization
- **Overall lower costs**
  - Lower costs may be outside the lab budget
- **Improves patient satisfaction**
- **Techs move to molecular**

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Facility Design—Lab & Hospital

- As lean activities mature, the physical constraints become limiting
- Lean facility design
  - Involved architects, contractors, subs, staff, patients
  - Use lean concepts to focus on patient
  - Build walk through models for simulation
  - Improve and built on time, on budget
  - Space is no longer arbitrary
- Designed and built for lean work-
  - 3 new satellite labs, blood bank, core remodel
  - Outpatient facility with OR
  - New hospital patient wing

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Plan-Do; Check-Act

- Check Act is difficult
  - Next project is ready to go
  - “Results already seen”
  - Less creative
  - Difficult work, rework, more change, confront failures
- One method is to hardwire PDCA
- Quality Management system e.g.
  - ISO 15189
  - ISO 9001
  - CLSI

ISO 9001 Via DNV For The Hospital

- Via CAP management requirements, the clinical laboratory has a robust quality management system.
- GAPs from CAP to ISO 15189 for the lab are
  - Cultural understanding of QMS
  - Audits and effective corrective actions
  - Continual improvement (like lean)
- Our lab led the way for the hospital to improve its QMS to meet ISO 9001 standards
- Diverted us from ISO 15189

Leaning Management

- Restricted project selection at top
- Leader standard work
- Daily management systems provide situational awareness
  - Visibility board
  - Data rich
  - In the moment
  - Tiered huddles

Our Lab Huddle Is Part of a System That Results in Real Time Action

- **SECTION TO LAB TO HOSPITAL**
  - **Sections** have huddles at various times
  - Information is filtered
  - Presented at **lab** huddle
  - Information is filtered
  - Presented, if needed, at **hospital** huddle
  - **AND BACK AGAIN**

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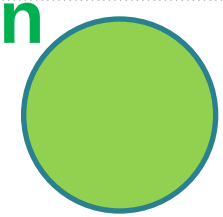
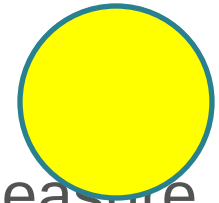
10 Minute Huddle Yields Mindfulness

Condition of the section

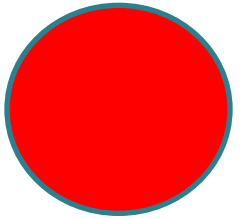
- Everything is good



- Compromised, things could go bad



- We have a problem without countermeasure
- Applied by each reporter before the huddle



Measures and Improvements

- Each day of the week has a metric for most sections
- The metrics are for the preceding week
- **Corrected reports**: errors that got out of lab, no typos
- **Overtime:** a defect in the system that forces it. Cost savings is both new ideas and test utilization savings
- **TAT:** usually one test or group. Percent meeting standard
- **Safety:** problems that could have reached the patient
- **Engagement:** progress on employee engagement plan, progress on section projects (e.g. new tests),recognition of employees which is reported to entire lab

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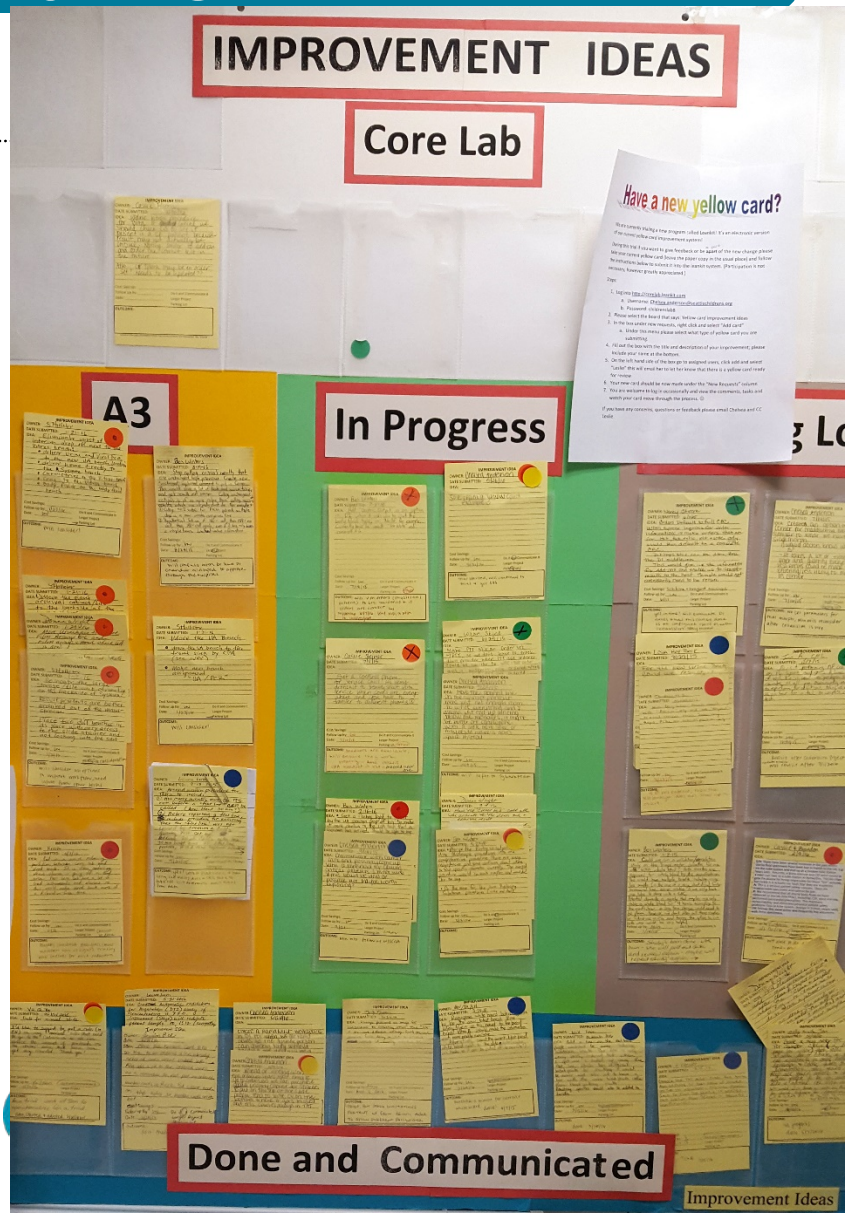
SAFETY
Quality- Amended Reports, Failed Assays
Cost- Overtime, Cost Savings
Delivery- TAT, New Assays
Safety- Lab Safety, Patient harm/ close call
Engagement- Impact Plan Progress
Announcements
2/11
2/12
2/
2/7
2/8
Biochem / Chem
9:10 9:00
Cell Markers
10:00
9, 1530-1600, 2230
Core / Bellevue 9:00
CPA: 1000, 1620
Whole: 1105, 1615
CPA / Phleb
Cyto / Array
10:15 / 10:10 MWF
Molecular Gen
0930
Histo / Path Admin
0930 daily / 10:00 Thurs.
Lab Client Serv
0930 Daily
LIS
1000 M
Micro / CF-Micro
M-F 0930, 1130, 1930
POC 8:30
Send Outs 9:30 ED
PSBC
2 CORRECTED
Vitros down
17 CPA errors
3 addendums
2 corrected
5.1 % : QC
Zero OT
2.0 OT
6.5 Hrs
PP ending 2/3
36.25 hours
.25
2.5 OT
2.25 OT
30 OT
3.75 OT
.75 OT
0 OT
↓$18,000
CENSUS
4 days
CENSUS 3 PI
0 PI
1
3 PI
Hospital Census 198
BMT 6
ECMO 2
AMB Visits
Hospital Census 211
BMT 6
ECMO 2
Hospital Census
BMT Berlin
ECMO AMB visits
Hospital Census 225
BMT 9 Berlin
ECMO 2 AMB visits
Hospital Census 228
BMT 8 Berlin

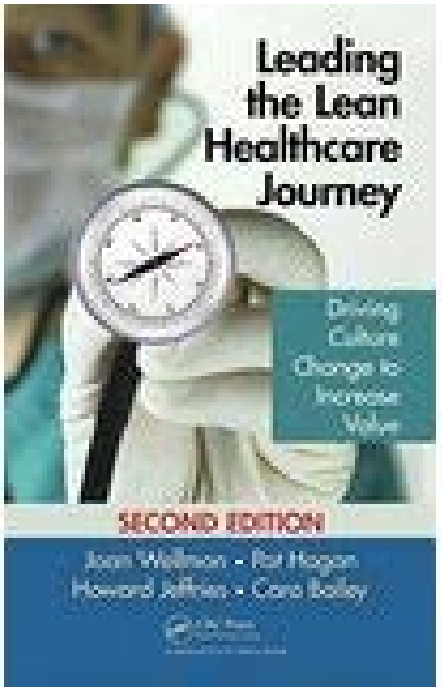
Advancing from projects to point improvements of standard work

- Simple, visual system
- Techs (and others) ideas come forward
- Evaluation
- Discuss at huddle
- Implement
- Or bigger project A3
- Or kill
- Celebrate done ideas
- HAVE LOTS OF IDEAS AND THROW OUT THE BAD ONES.



Lab—Hospital Partnerships

- By adopting these systems early
  - Favorable status as change leaders
  - Access to resources
- Involvement in the hospital process yields respect
  - Contributing learning from lab to hospital—the lab as a lab
  - Interactions with more departments
  - Engagement of the lab staff in hospital work
  - Participation in hospital decision making
  - Lab QMS into the hospital with ISO 9001
  - For more on hospital see this text



Milestones

Learning via readings
discussions,
seminars,
factory tours, &
DOING.

- Resetting core lab
- Rapid Process Improvement Workshops in all sections
- Value Stream in Microbiology
- Facility design for lean
- Huddle Management
- Frontline point improvements
- Integration of quality, auditing, corrective action
- Cultural Change to Lean Thinking

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Priorities for Continuing Improvements

- Standardize sections' ideas-to-improvements work
- Involvement of new hires in lean work, learn by doing
- Focus measures on those that matter, i.e. 5S our data
- Design a new lab that is leaner and more flexible
- Bring ISO 9001 concepts back to lab
- Dreams
  - Increase our outreach education and its adoption
  - Convert more work to publications
  - Amplify the work via replication
  - Promote self-sustaining

Lessons Learned

- **Partnership with hospital has been synergistic**
- It takes time and effort to see results
- Make the process and improvements visible
- Requires a long term view to get the real payoff
- Don’t forget to “Check-Act” after you “Plan-Do”
- Very engaging for staff, faculty and families
- Requires substantial leadership and financial investment
- This is *hard work requiring constant energy input.*

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Thank you. Questions ?

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