

# A CLINICAL LABORATORY *IN TRANSITION*

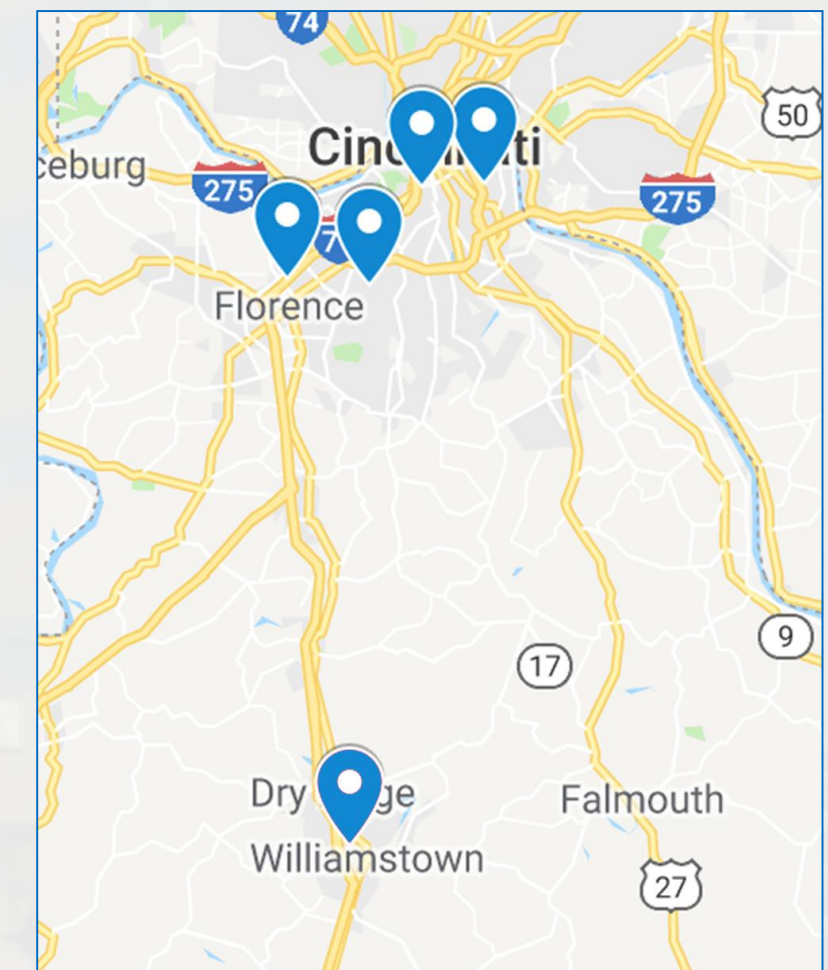
LEAN PROCESSES | ANALYTICS | POPULATION HEALTH

Improved productivity & cost reduction through collaborative consolidation



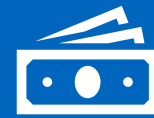


**A system of 5 hospitals  
serving a diverse patient  
population throughout the  
Northern KY region**





## Drivers in the Lab Industry



### Consumers

Demand a lower cost and better access to healthcare



### Facilities

Healthcare is delivered in a variety of spaces



### Payors

and medical necessity guide and control the delivery and reimbursement of healthcare services

## Response to Trends



### Proactive Strategy

To Implement Lean Principles Everywhere



### Business Plans

Short and Positive ROI



### Collaboration vs. Competition

Network with your Peers



### Monitor Progress

REPORT your SUCCESS with DATA

# Journey to Deliver More

DECREASE COST, IMPROVE PRODUCTIVITY, MAINTAIN QUALITY

- Unsuccessful Lean Project
- **2009/2010**

- Implemented a Front-End Specimen Processor and Maldi TOF for Organism ID - Microbiology
- **2016**

*Preparing for what's next . . .*

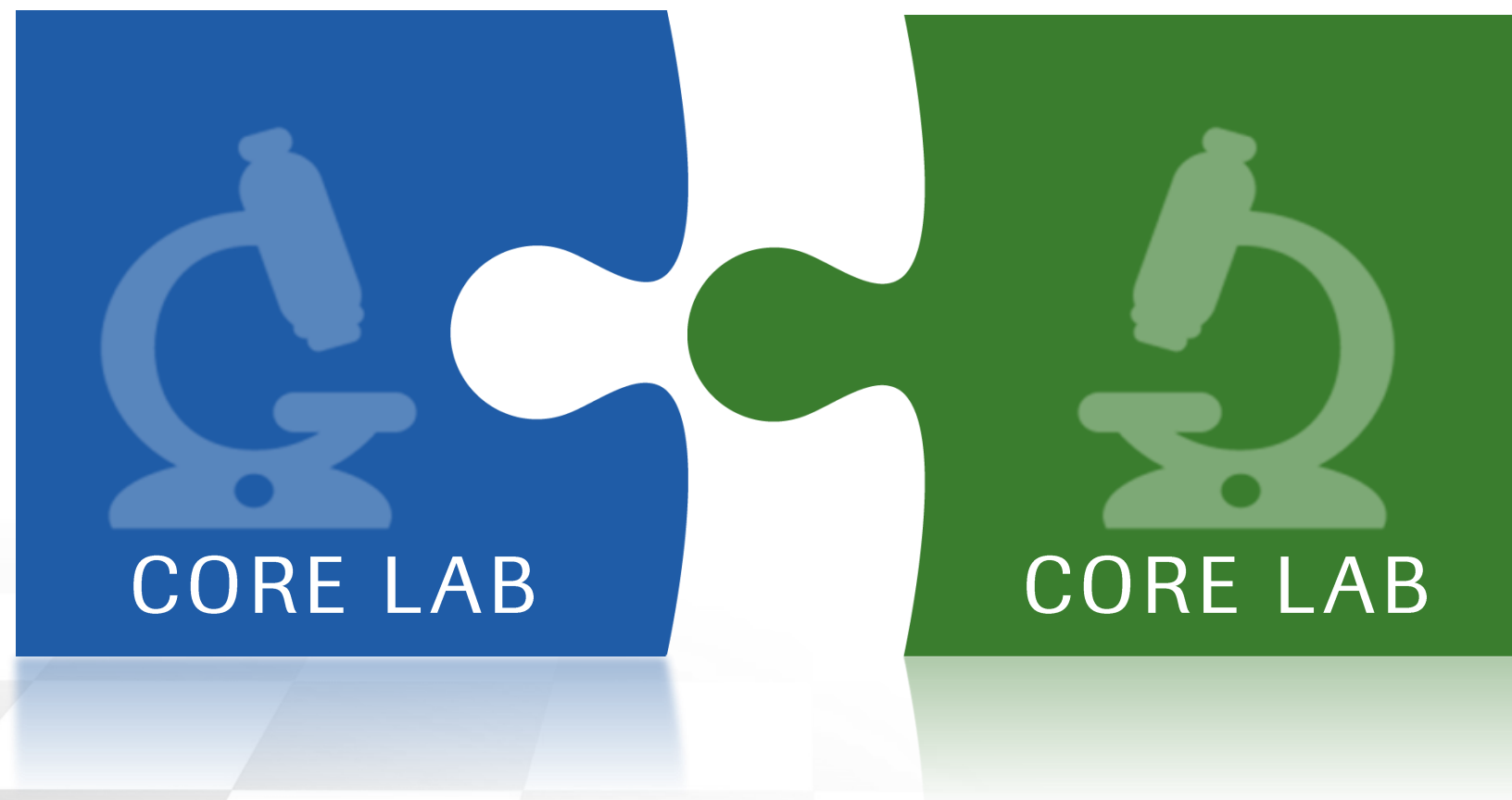
- **2013**
- Automated Chemistry Line and Standardized Equipment/SOPS across the System

- **2017**
- Implemented a Full Micro Automation Line
- Migrated the LIS to Epic Beaker

# Prepare to Double up...

COST REDUCTION THROUGH CONSOLIDATION

*Collaborative opportunity to consolidate outreach labs*

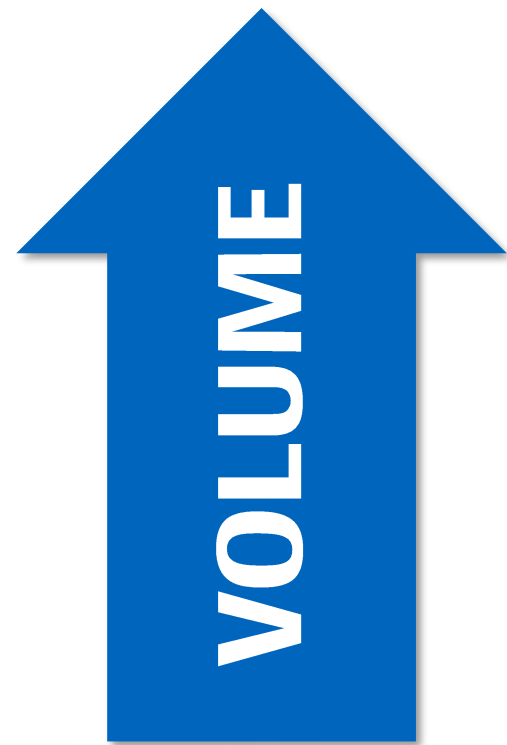


## JV Outreach Laboratory

*while providing  
uninterrupted services*

# Target Goals

DELIVERING TO A PRO FORMA



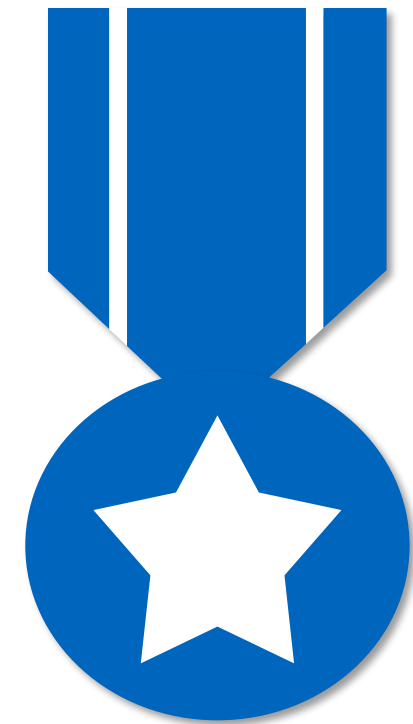
Increase volume to  
**>4 million**



Cost savings of  
**\$2 million**



Drive labor ratio down  
**FTE savings**



Set standards for  
**Quality**

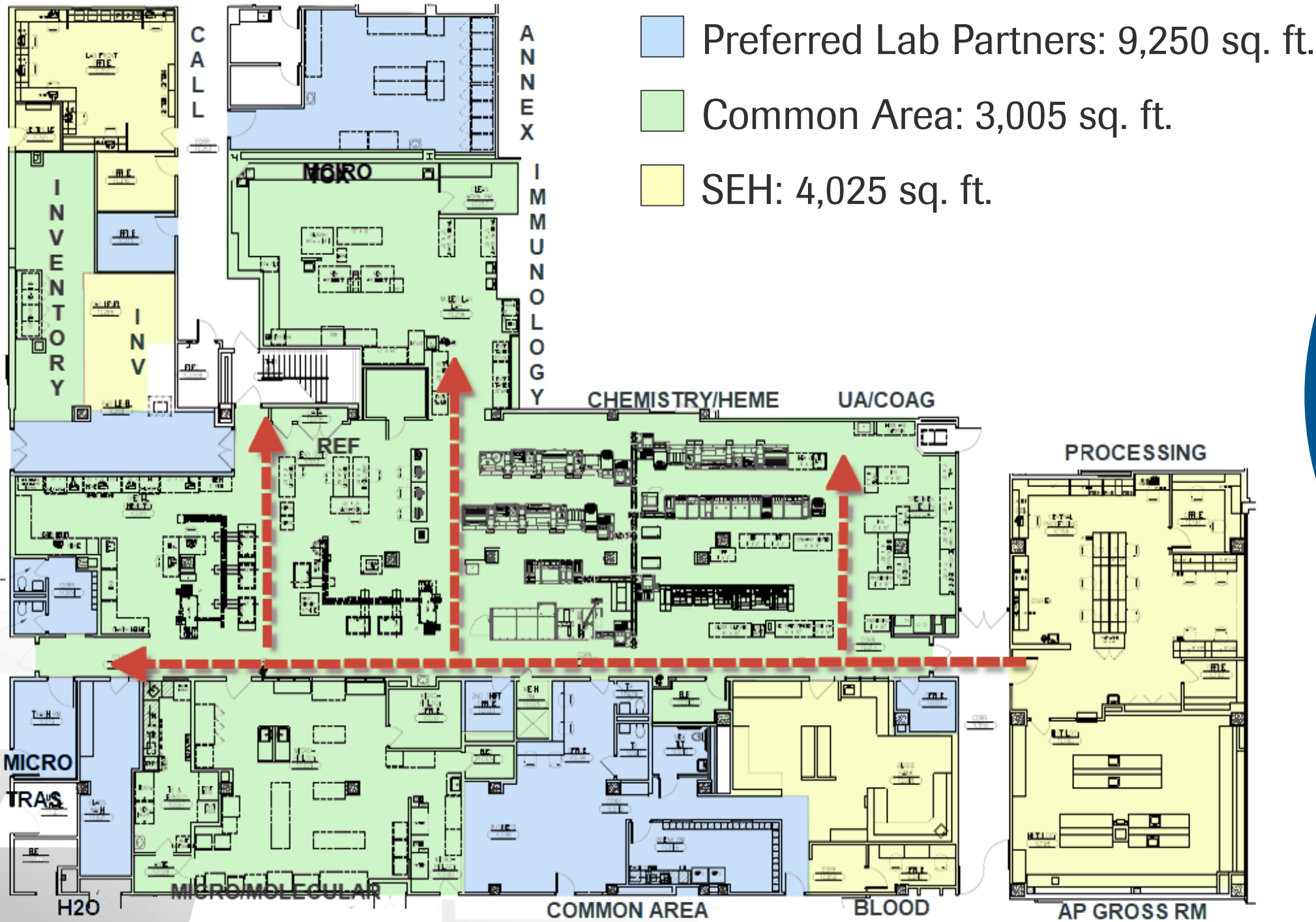
## The To-Dos

- ☐ Convene the Executive Steering Committee for JV Lab
- ☐ Renovate lab spaces (Processing, Core, Admin, MLS Program)
- ☐ Order, install, verify new equipment
- ☐ Verify all test assays on new equipment
- ☐ Review/adjust test menu and SOPs
- ☐ Review all reference ranges and alerts
- ☐ TEST/ TEST/ TEST LIS/IT connectivity (Different LIS)
- ☐ Integrate staffing - on-boarding and training
- ☐ Go Live to coincide with JV partner's end date



# Mapping The Process

## FLOW OF SPECIMENS



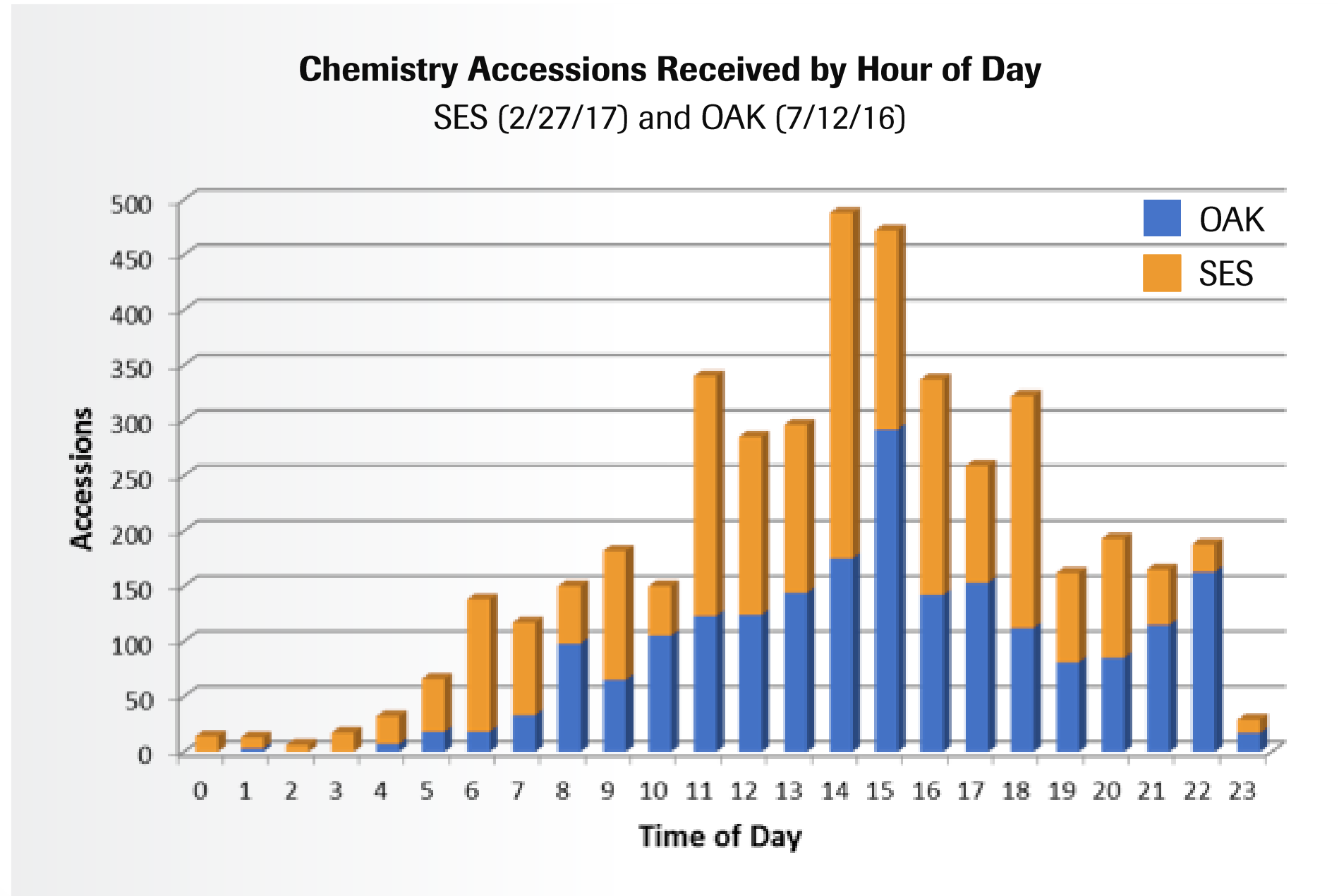
Consolidation  
in a  
**LEAN  
PROCESS**



# Data Analytics: Pre-JV

## EXAMPLE OF ASSESSMENT OF VOLUME BY HOUR FOR BOTH SYSTEMS

**Combined  
consolidated  
chemistry volume**



# Leverage Technology

## ASSESS FOR IMPROVEMENTS TO PROCESS

++++ PROCESS

**Connectivity:  
Roche 8100**

**Total Specimen  
Management  
System:**  
Roche 8100

**Chemistry &  
Hematology**

Processing for  
Immunology and  
Send-outs

+ NEW HEME SYSTEM

+ NEW PROCESS

**Sysmex  
Hematology +  
Cellavision**

Reduction in CBC  
Differential  
Scope Time  
Reduction

ADD TO CURRENT

**2 Copan WASP  
Lab Automation  
Systems**

Processors /  
Incubation  
Systems w digital  
cameras for  
automated timed  
culture plate  
reads

**Bruker Maldi-  
TOF (Time of  
Flight)**

For organism ID  
from culture  
(Results in  
Hours vs. Days)

ADD TO CURRENT

**Molecular  
Platforms**

Organism / Viral  
Detection  
Systems Reduced  
Time to Result  
and Treatment.

**LC MS/MS**

Definitive Drug  
Testing Platform –  
Reduced TAT.

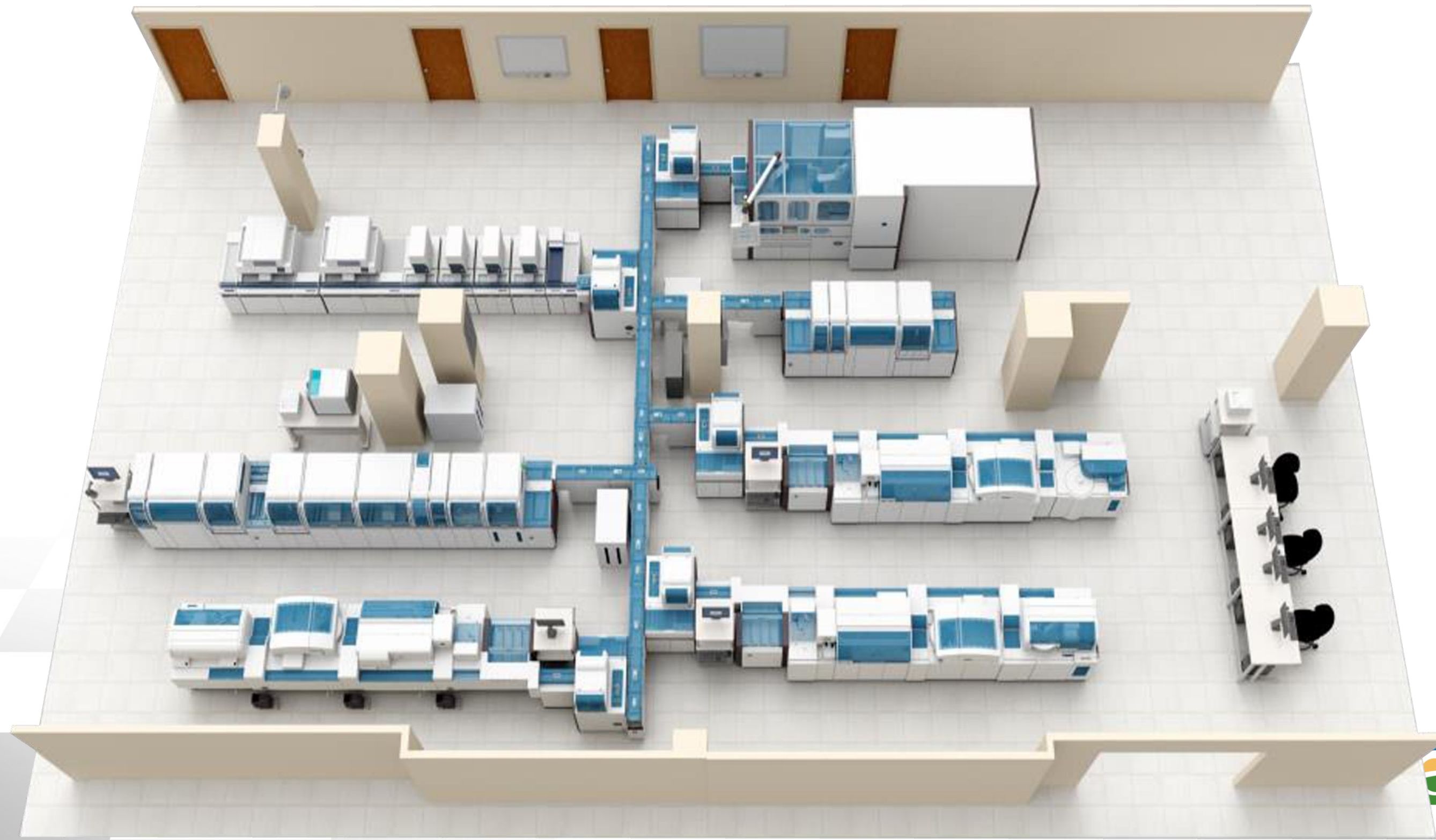
# Connecting

- [illegible]



# Core Laboratory

AUTOMATED PROCESSING/TESTING LAB - CHEM/HEME/IMMUNO/REFERENCE



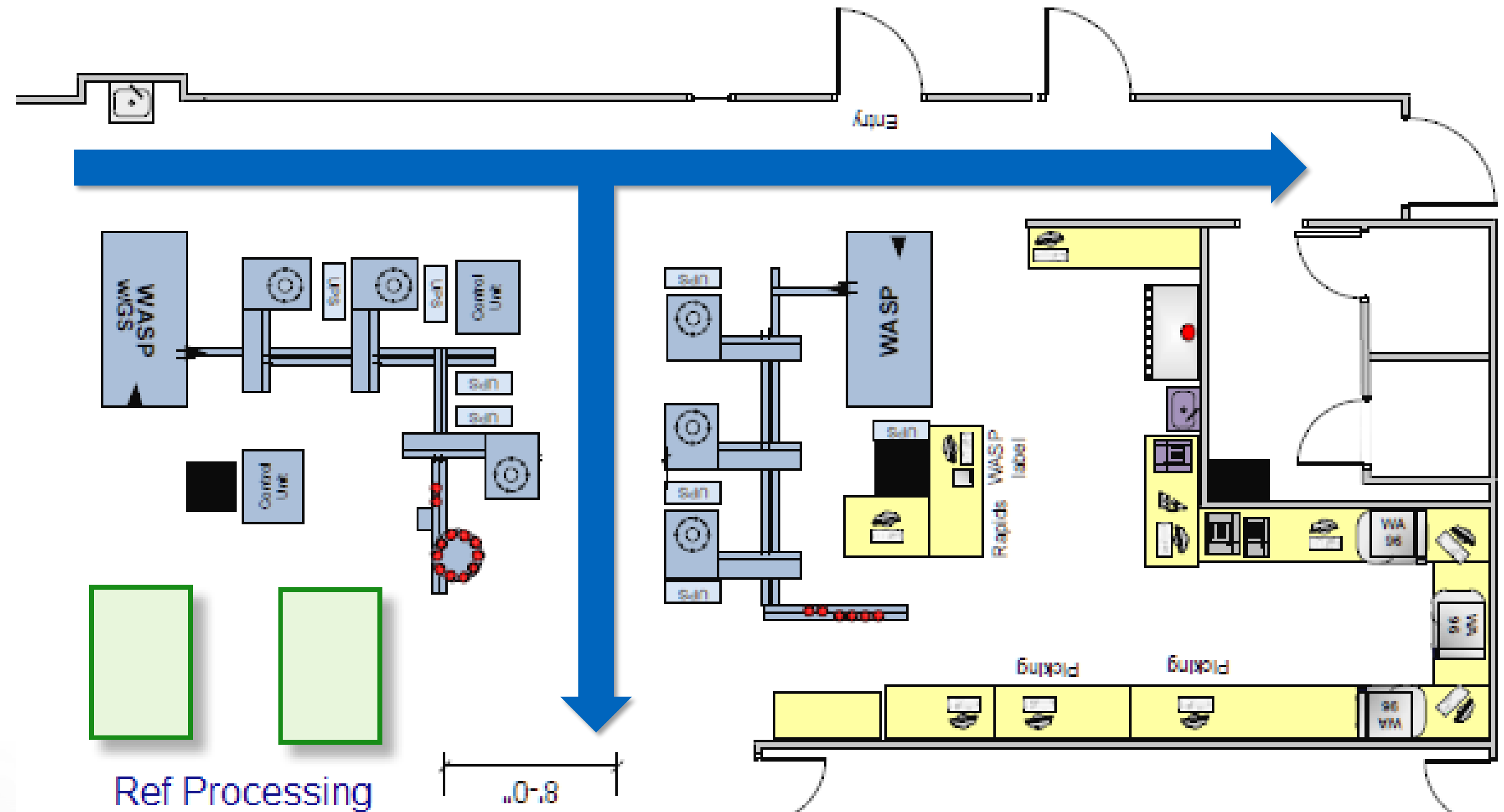
# Micro Core Automation

## Most culture types processed

- ✓ Inoculation
- ✓ Streaking
- ✓ Labeling of plates

**Uninterrupted incubation** with Standard Photo Shoots/ Digital Reads

## Waste Management



# Micro Automation





# Early Days of Transition

1ST DAY OF GO LIVE – INTERFACE DISCONNECTED



## Early .4 FTE Savings

### Hematology

- Reduced slide review rate to 10%
- Manual diff rate (scope) from 100% to 1.4% using Cellavision

### Microbiology/Molecular

- Difficult transition: volume, new LIS and staffing shortages were all challenging

### Chemistry

- ED Lab for STAT In-Patient Testing helped us adapt to new volumes while maintaining service levels

### Immunology

- Worked to have specimens sorted by Platforms - Optimization of Roche 8100
- Increased the number of Reference Tests interfaced to optimize processing by the Roche 8100

### Hematology/Coag/Urines

Sysmex updates: Go live was May 14, 2018

Pre Sysmex Slide Review Rate: 25-30%    Manual Diff Rate: 100% (Microscope)

June Slide Review Rate: 10%    Manual Diff Rate: 1.4% (Majority on Cellavision)

→ Also, we have gone paperless!



AND Validated/Implemented 2<sup>nd</sup> IRIS

#### Test volumes:

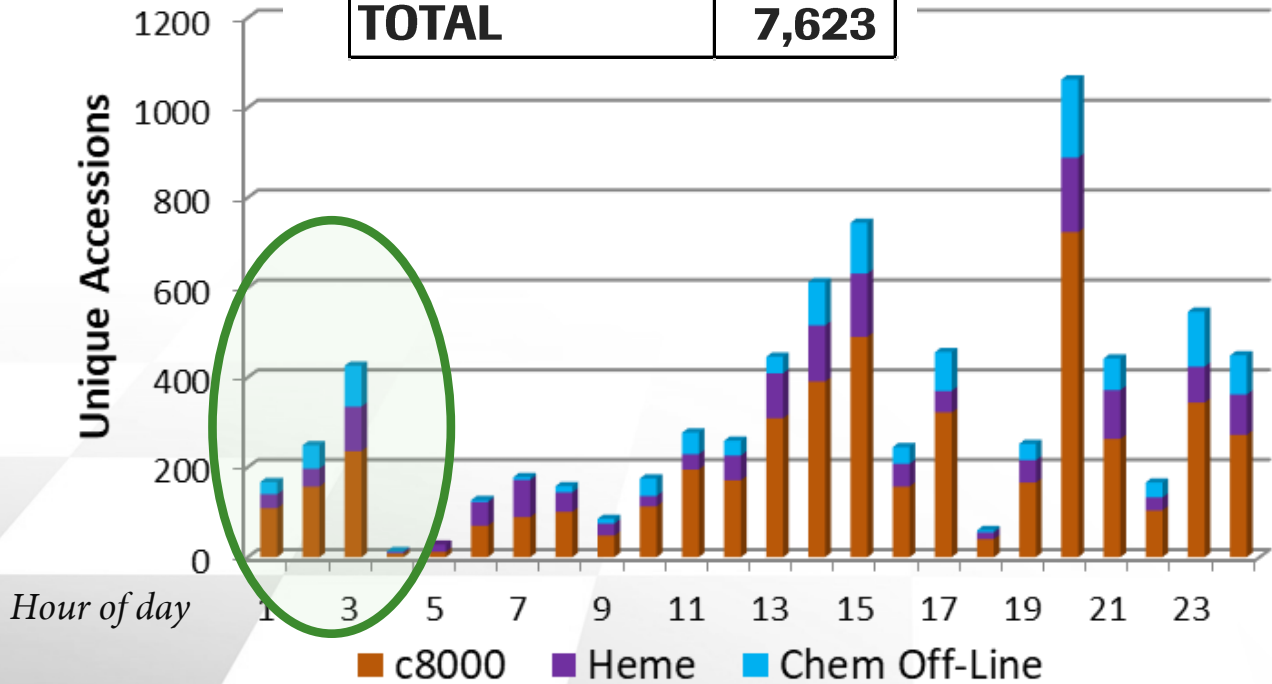
Month	Test	Volume		Test	Volume
May	CBC/CBCD	20,621		UA	3,406
June	CBC/CBCD	29,404		UA/UA Complete	4,594
July	CBC/CBCD	29,964		UA/UA Complete	4,964
% Increase		45%			45%

# Process Improvement in Specimen Management

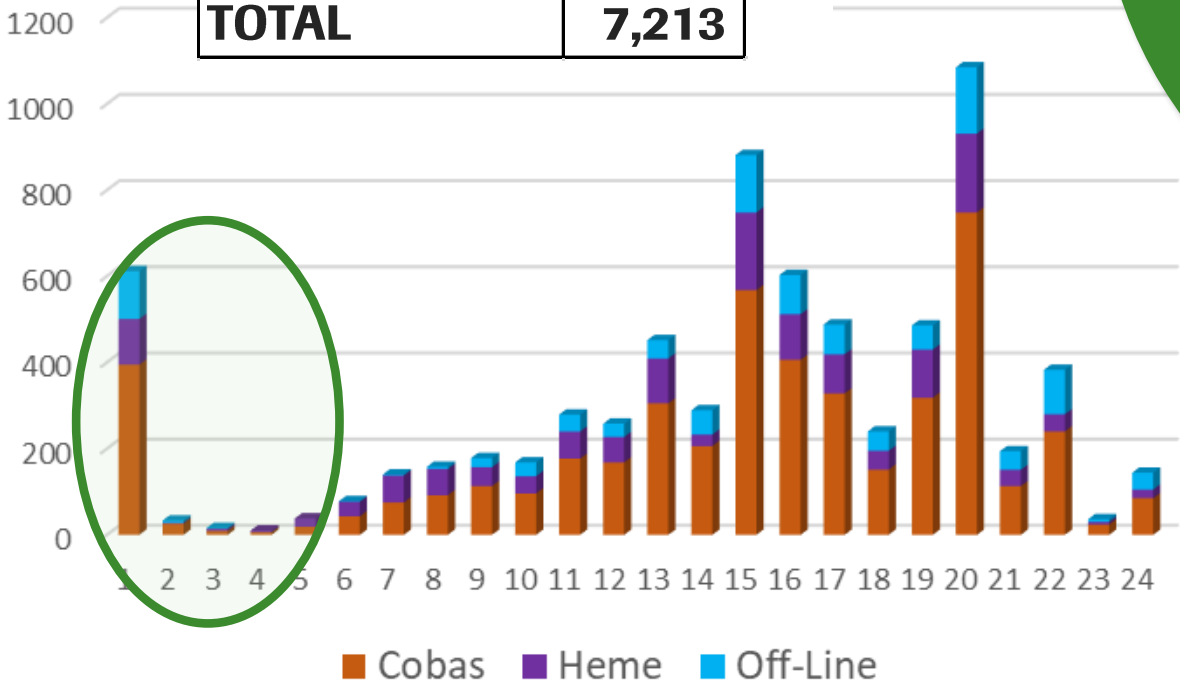
## LIS Analysis of Specimen Management for Core

8/28/18 before TSMS vs. 3/26/19 post TSMS

Accessions 8/28/18	
Chem	4,890
Heme	1,512
Chem Off-Line	1,221
<b>TOTAL</b>	<b>7,623</b>



Accessions 3/26/19	
Chem	4,711
Heme	1,415
Chem Off-Line	1,087
<b>TOTAL</b>	<b>7,213</b>



The data guides us to **opportunities to optimize**

# Recap Consolidation

## 2 Core Outreach Labs in One Space

*Uniquely within a hospital facility*

- ✓ Sharing the cost to minimize overhead (lab and administrative)
- ✓ Collaboratively working with physicians and care centers
- ✓ Sharing initiatives for improved quality and utilization

**1st year  
annualized  
savings of  
\$2 million**



# Recap Lean Processes

## ➤ Design of space

Flow of specimens from central processing to Roche 8100 and WASP Lab

## ➤ Automation

Total specimen management system in core lab and microbiology

## ➤ Designated job roles

- Lab assistants: TSMS and Micro Processing
- Lab techs: assist in testing with technologist oversight
- MT/MLT: higher level performance/analytics/consultations

## ➤ HIS/LIS

Optimize orders, collections, results

## ➤ Team Communications *(Huddle Boards)*

## AUTOMATION: Full use of technology

- ✓ Roche 8100  
(Chem, Heme,  
Immunology and  
Reference)
- ✓ WASP Lab  
(most culture types)

# Recap Data Analytics

- **Impact of Change in Volume**
- **Progress of Implementation**
- **Areas of Opportunity or Success**
  - When to schedule/perform maintenance
  - Where and what is our capacity (specimens received by hour)
  - Time specimens spend in waiting and in transport
  - Time to completion of outreach workload
- **Quality Metrics**
  - TAT (Overall and STAT)
  - Critical Result Notification
  - Corrected Results
  - Specimen Exceptions

Prove the success  
of the Pro Forma

**Delivering on  
productivity  
and cost**

# Recap Lean and Quality

## Leveraging Technology that Implements Lean Principles:

### Roche 8100

- Inserts quality checks (cap color recognition – serum, plasma [additives])
- Aliquoting with bar-code labeling for reference lab

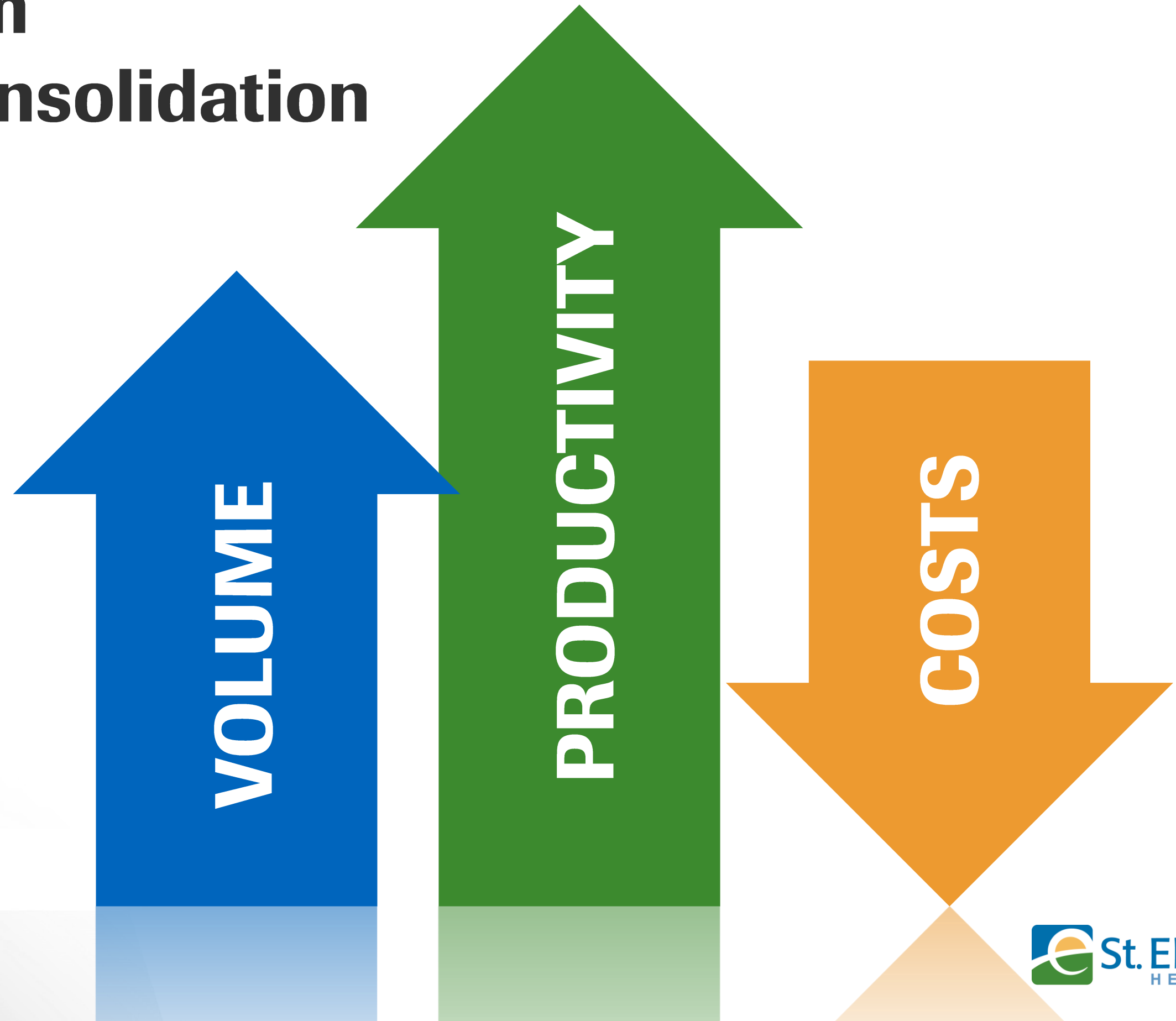
### WASP Lab

- Consistent plate streaking patterns
- Consistent incubation times
- Consistent read times

**Reducing human touches provides consistency in process time**

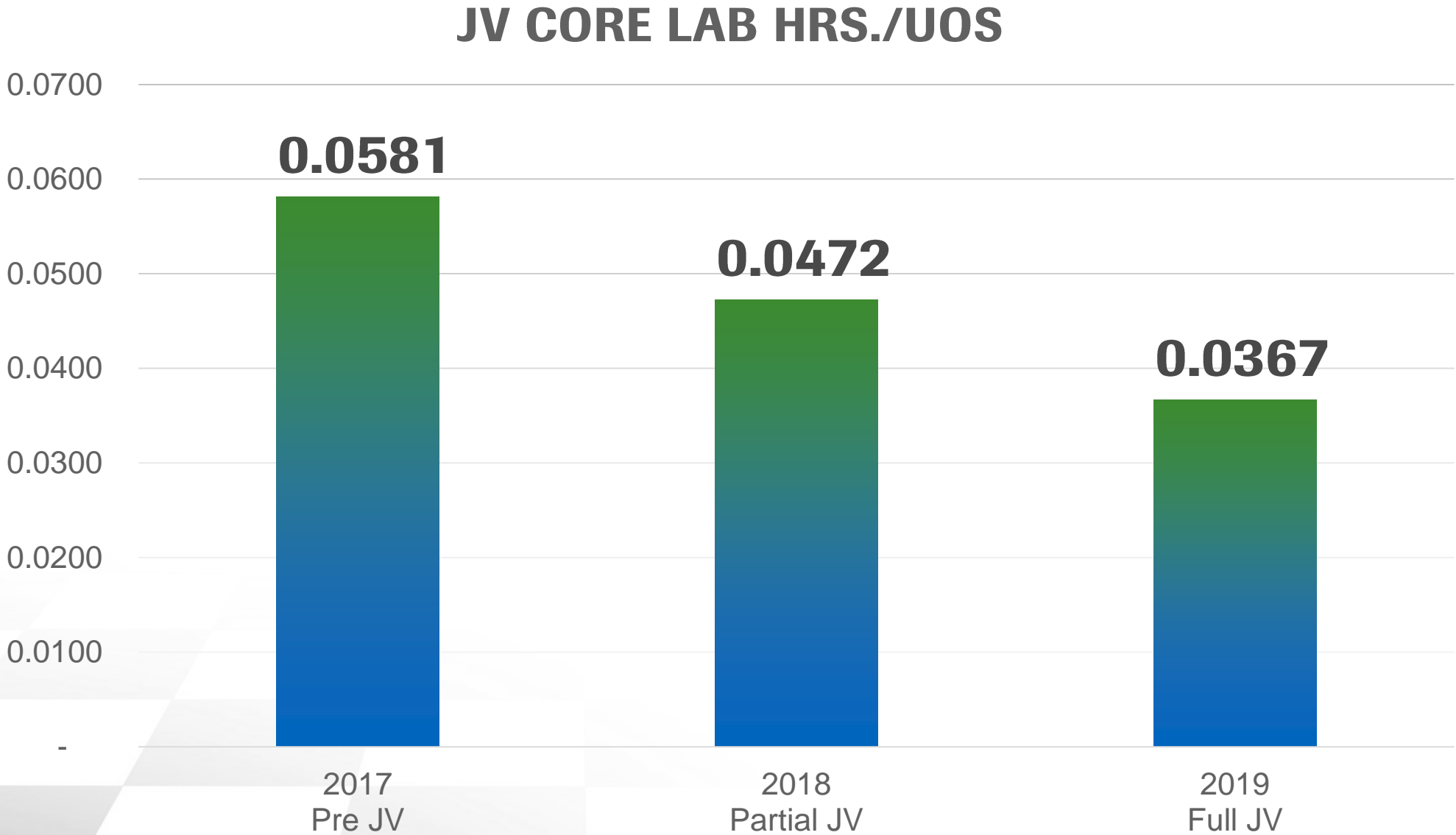


# Deliverables from Collaborative Consolidation



# Improved Productivity

## CONSOLIDATED OUTREACH LABS

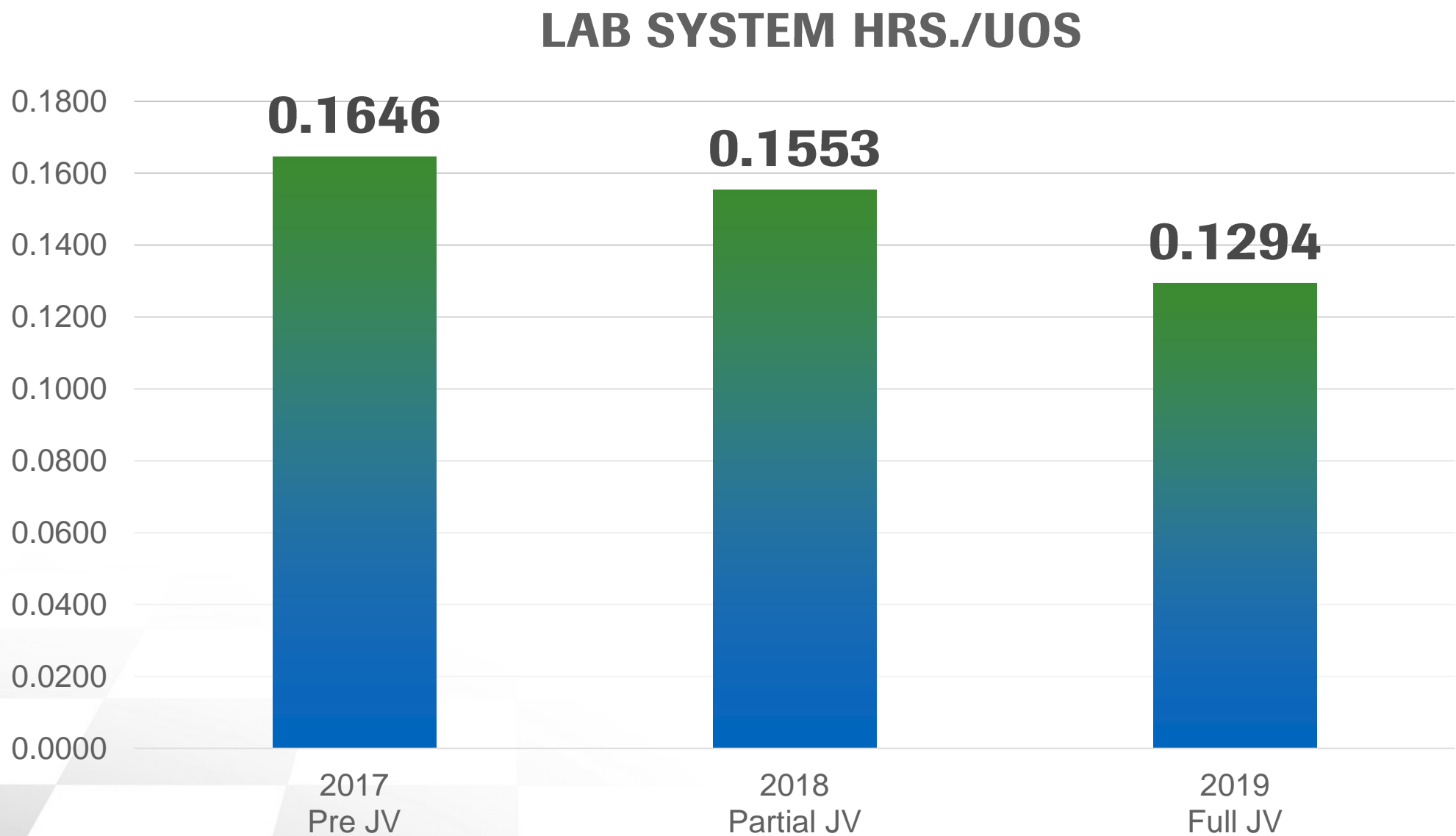


**37%**  
decrease in  
hours/UOS

Estimated  
Annual Savings  
of  
**26 FTEs**

# Improved Productivity

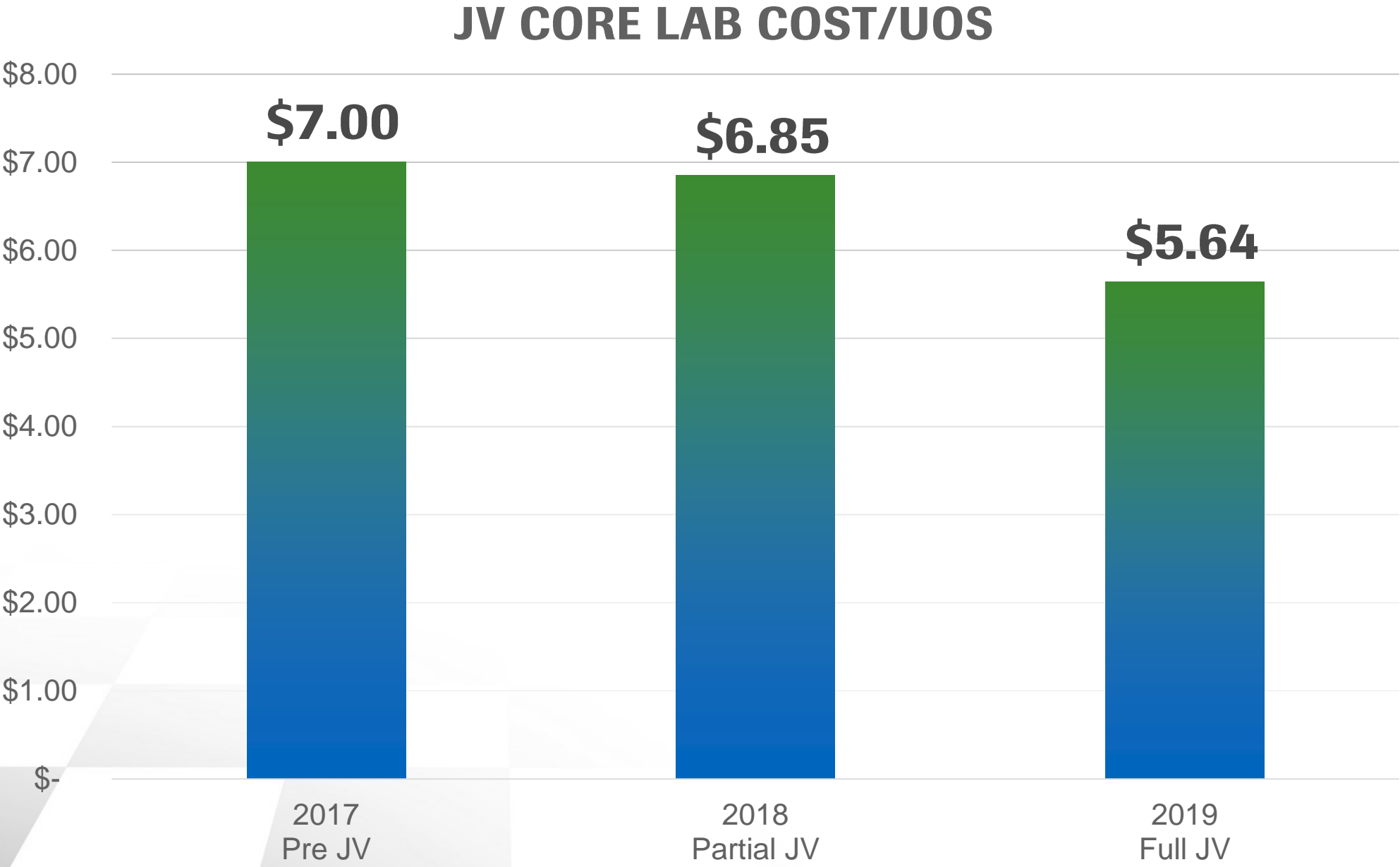
## SYSTEM IMPACT



**21%**  
improvement  
for the system

# Reduction in Cost/UOS

CONSOLIDATED OUTREACH LABS

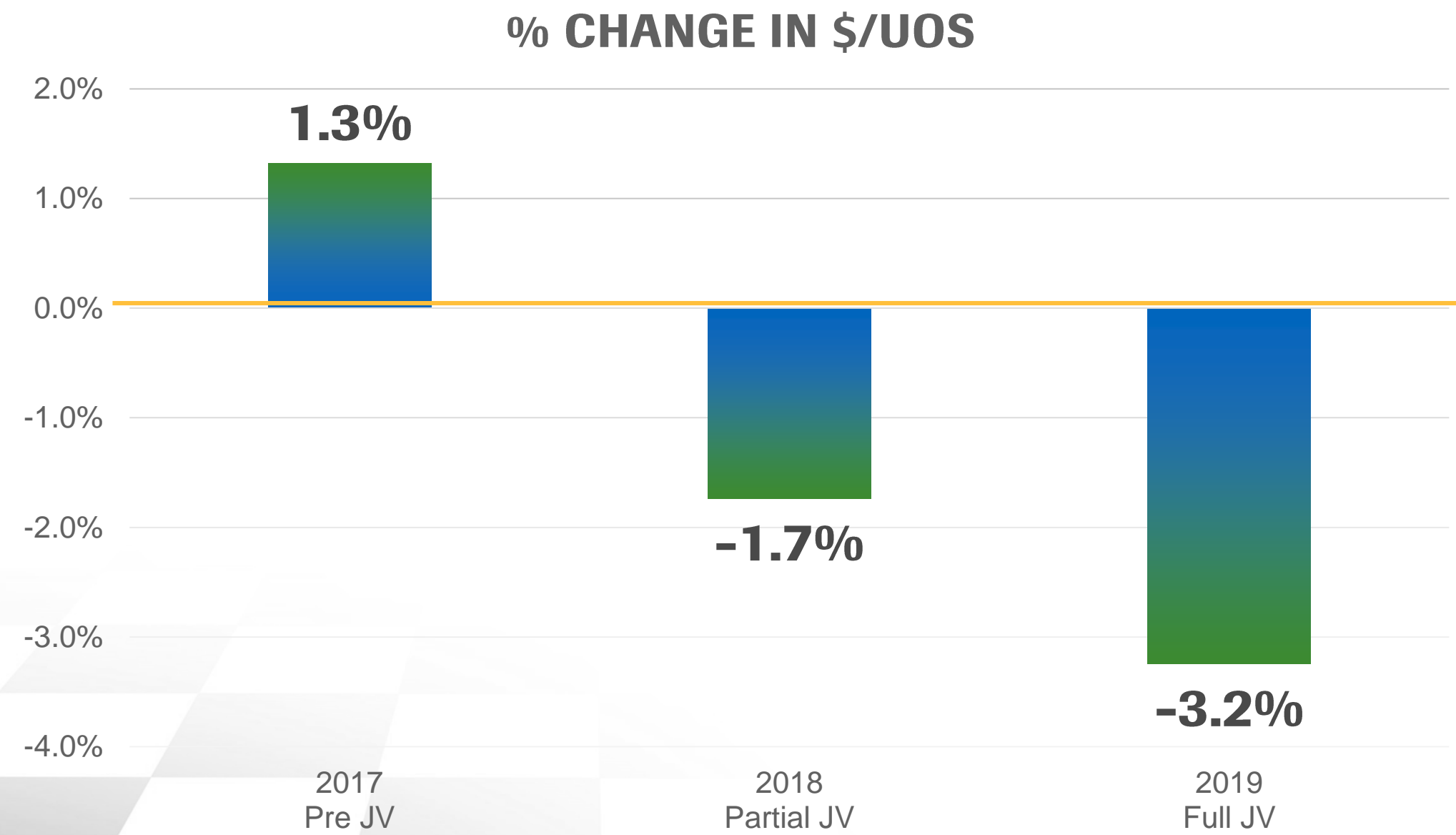


19% decrease



# Reduction in Costs

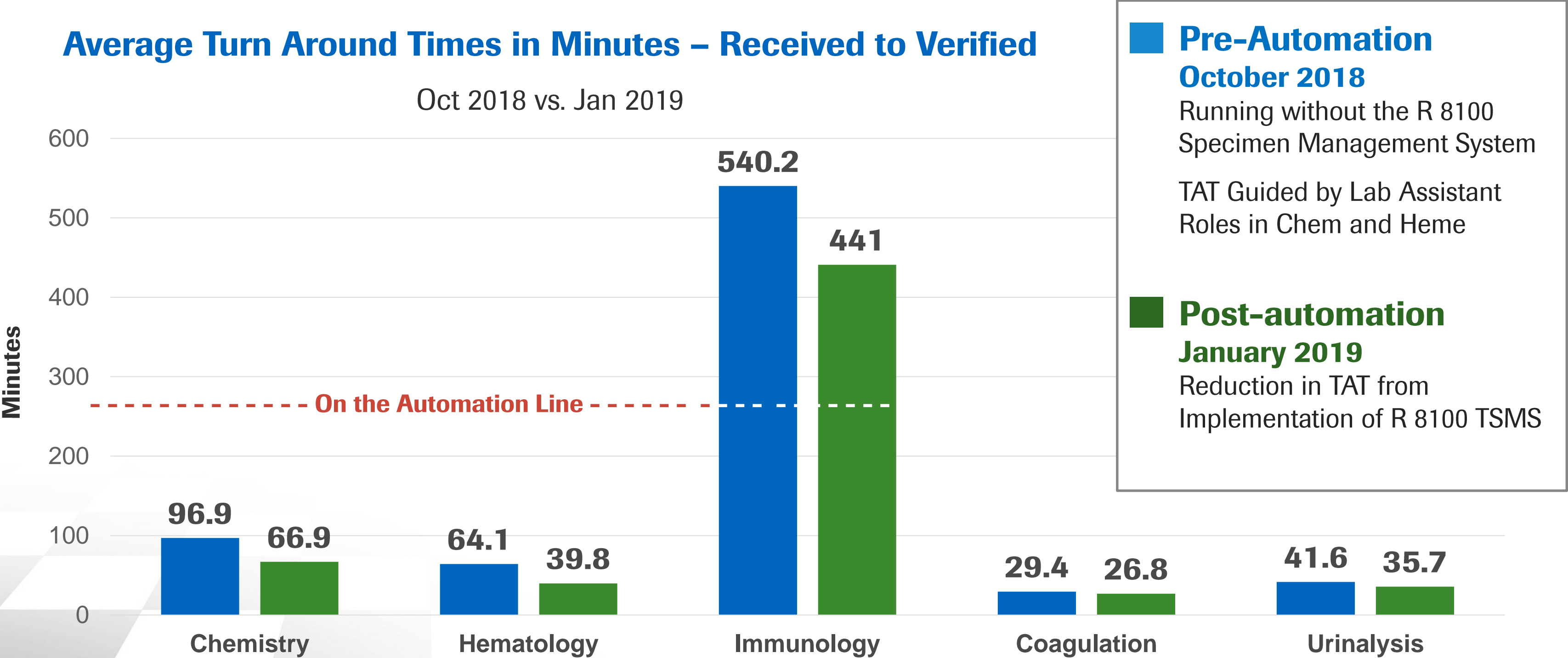
## SYSTEM IMPACT



**4.9%**  
Overall  
Decrease

Estimated  
Annual Savings  
Greater Than  
**\$3 million**

# Quality Metric TAT



# Impact on Quality Metrics

## Shift Reports with Metrics

- TAT
- Critical call results
- Exception reporting

## Monthly Reports (delivered to customer/JV partner)

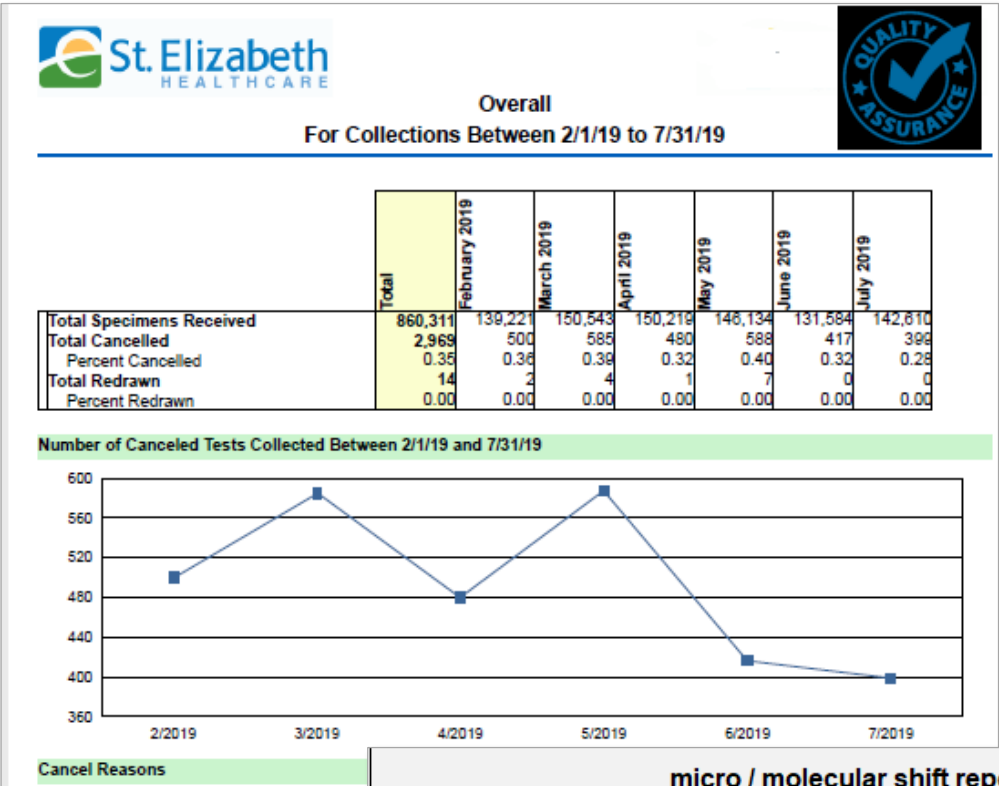
- TAT and volume
- Exceptions for cancels, redraws and corrections

## Clinical Medical Director for the JV

- Driving actions and quality faster
- Clinical Laboratory Advisory Committee (2019)
- Lab Utilization with Comprehensive Dashboards

## New Projects Underway

- Foreign bar code recognition
- AI for Microbiology - Automated Growth/No Growth



**micro / molecular shift report**

Major issues or findings:

☒ No major issues  
☐ Major issue experienced. Details:

☐ All automation & instrumentation operated properly throughout the shift  
☒ Down-time/issues experienced with (check all that apply)

☐ Wasp Processor 1 ☐ Wasp Processor 2  
☐ WaspLab1 Line ☒ WaspLab2 Line  
☒ WaspLab1 Incubator ☐ WaspLab2 Incubator  
☐ MALDI ☐ Vitek ☐ Microscan ☐ Previ GS'r  
☐ Cepheid ☐ Biofire ☐ ePlex (GenMark) ☐ Panther  
☐ illumipro/alethia (Meridian) ☐ BD Max  
☐ Beaker ☐ BacTalert ☐ Other ancillary equipment

Up time for automation/instruments:

Summary  
WL1: Andrew and Brian returned today and seem very hopeful about final tweaks to the incubator plate platform settings.

WL2 Line:

Most notable item(s) of the shift:  
It was a good day. Everyone happy even with both lines being serviced. Yeast MIC verification continuing, ePlex QC and result review continuing, devising training schedules for BD Max and HCV on Panther. Things are coming along.

No major issues in any departments.

CHEMISTRY STAT TAT

TAT	# Specimens	# Misses	% Compliance
30min	23	8	65.22
35min	23	3	86.96
40min	23	0	100.00

Test Section CONT MPI Specimen ID Test

EDG  
CHEMISTRY CMP  
CMP-1636: 37min from receive in CP to front load on instrument.

HEMATOLOGY STAT TAT

# Specimens	# Misses	% Compliance
60	4	93.33

Test Section CONT MPI Specimen ID Test

EDG  
HEMATOLOGY CBC W Diff  
EDG  
HEMATOLOGY CBC  
EDG  
HEMATOLOGY HGB & HCT  
EDG  
HEMATOLOGY CBC W Diff  
CBC-0390: critical high WBC count needing albumin smear and sli  
CBC-0068: low plt count needing slide review.  
H&H-0422: waiting for tube to come off 8100 to check for clot bet  
CBC-0067: low plt count needing slide review.

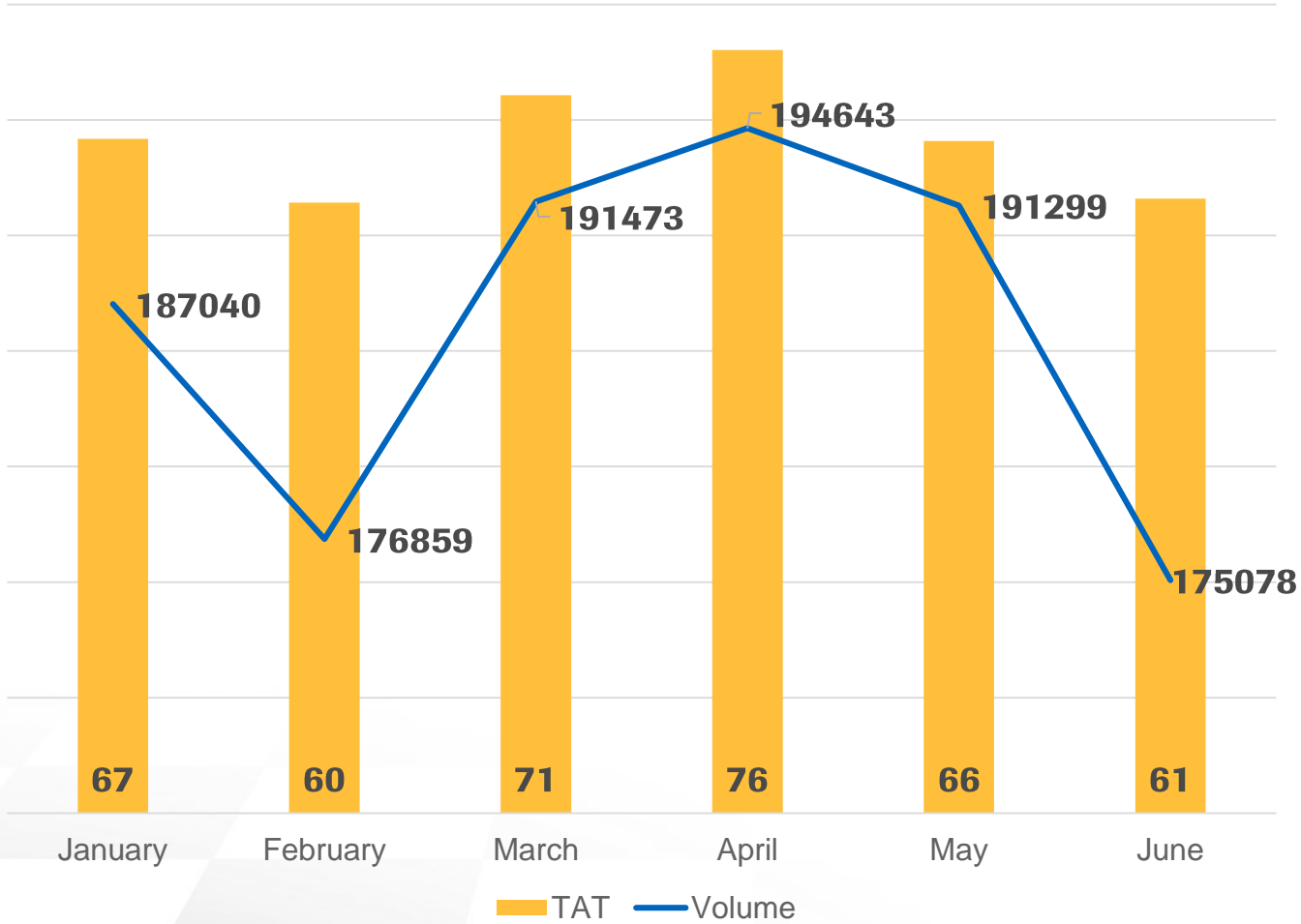
CRITICAL CALL TAT

Column1	# Criticals	# Misses	% Compliance
Total #	12	0	100.00

# Quality Metrics TAT

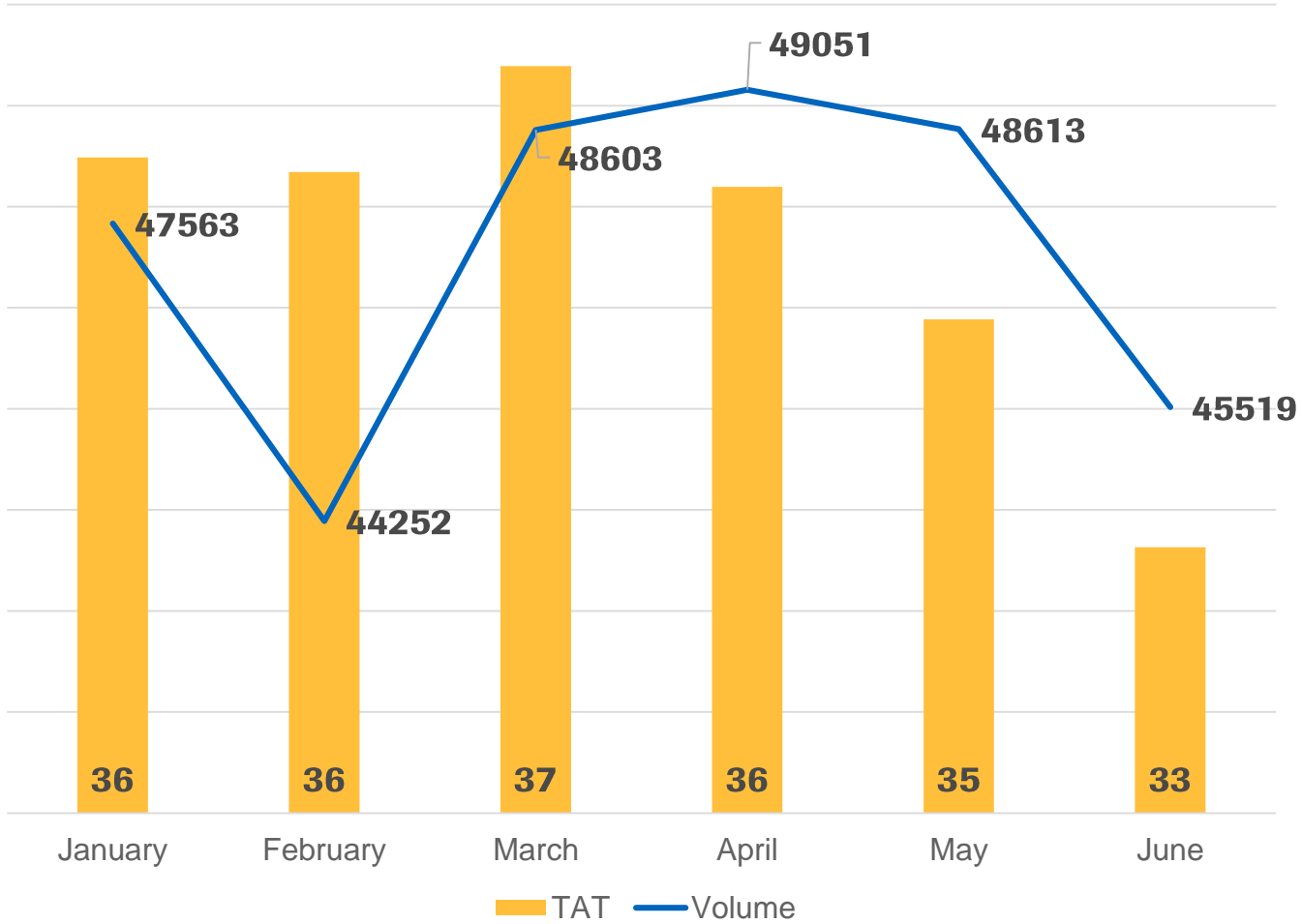
## CHEMISTRY AND HEMATOLOGY

2019 Chemistry Turn Around Times (min) and Volume



66.8 MIN AVG TAT

2019 Hematology Turn Around Times (min) and Volume



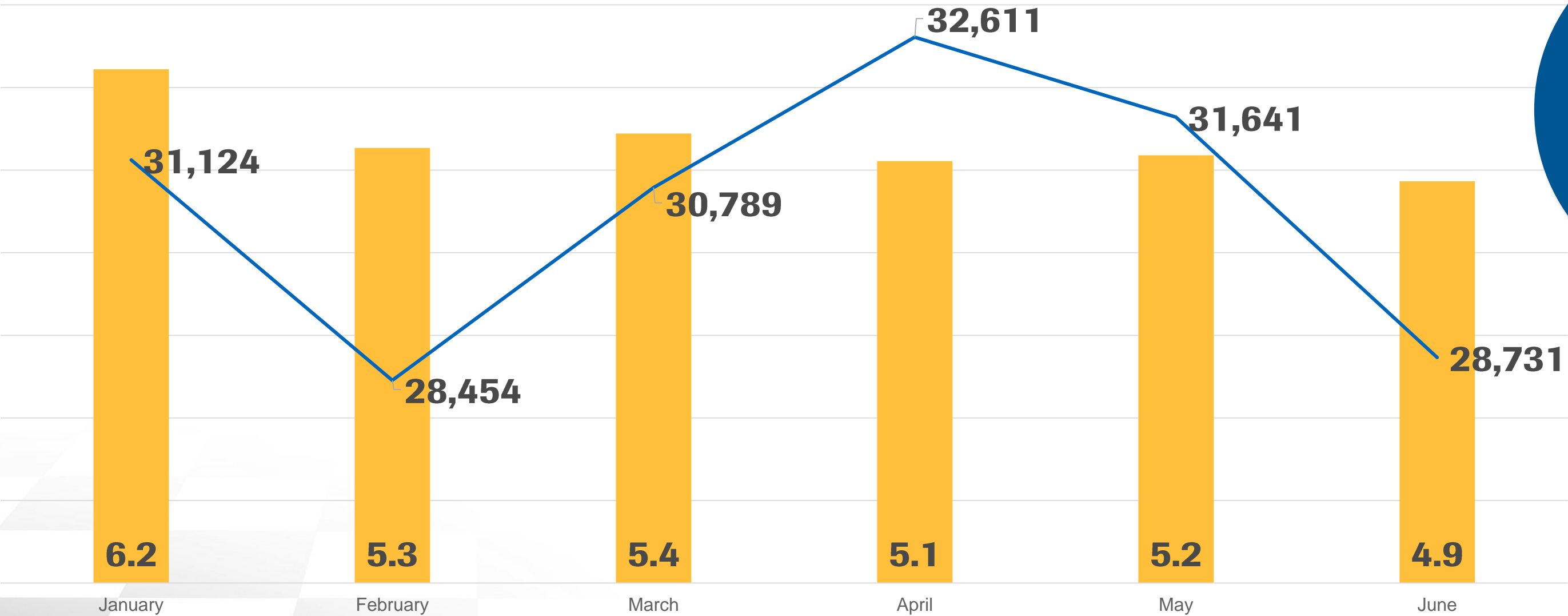
35.5 MIN AVG TAT



# Quality Metrics TAT

## IMMUNOLOGY TAT AND VOLUME

2019 Immunology Daily Testing Turn Around Times (hrs.)\* and Volume



**5.35 HRS  
AVG TAT**

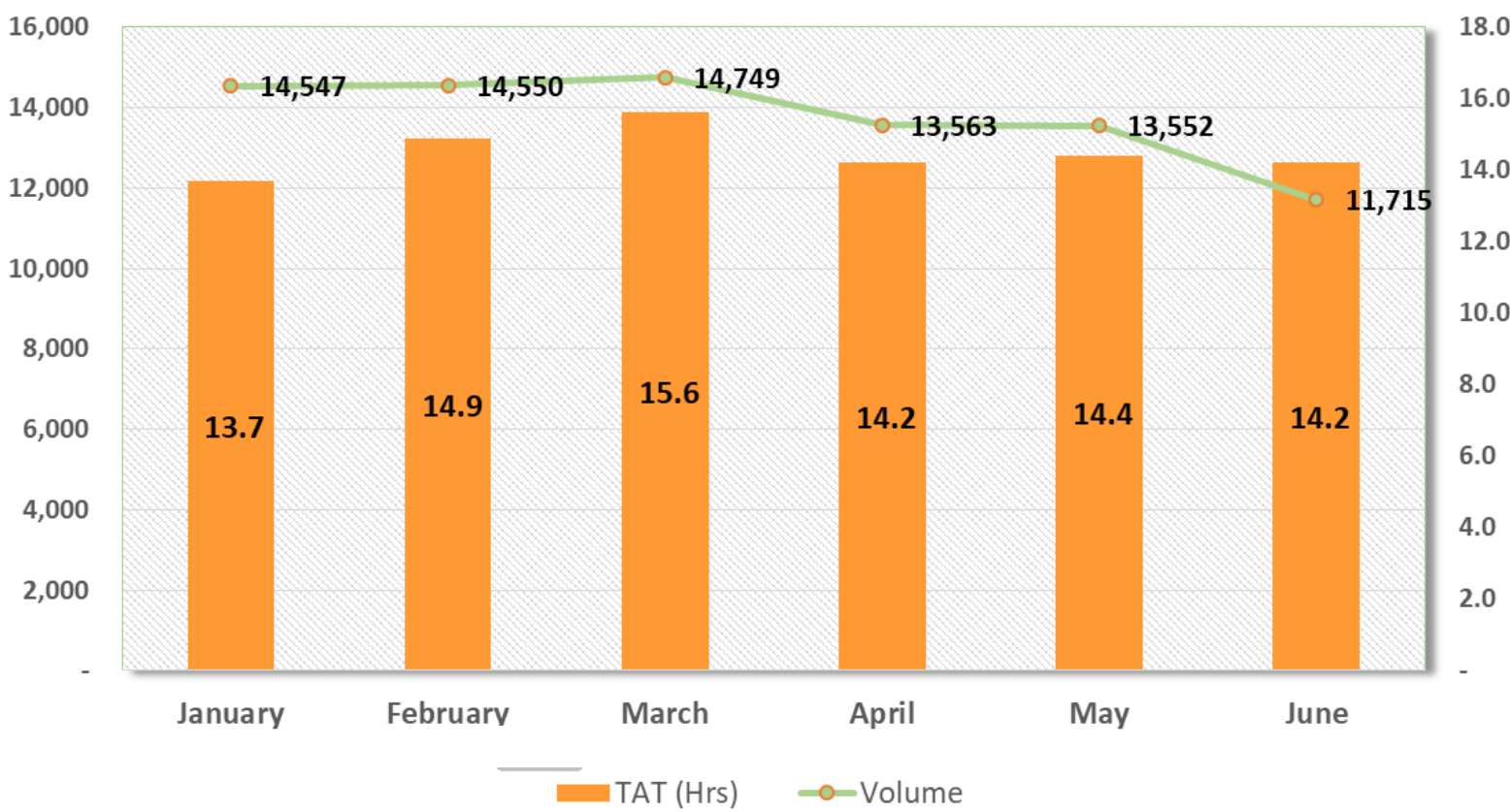
— ANA Scr, ANA Screen by IFA, Acute Hepatitis Panel, C-Peptide, CA 125, CCP Ab IgG, CEA Ag, EBV Viral Capsid Abs, FIT, FIT Screen, Fetal Fibronectin, HIV Ag/Ab, Hep A Ab IgM Acute, Hep B, Hep C, High Risk HCV Ab Rfx, Homocysteine, Mononucleosis Scr, Mumps Ab IgG, REPEAT NBS, RPR Qnt, Rapid HIV 1 & 2 Ag/Ab, Rubella Ab IgG, Rubeola Ab IgG, Syphilis Scr Rfx Qnt, T Pallidum Ab by TP-PA, TB Gold Plus, Tacrolimus, Thyroid Peroxidase Ab, VZV Ab IgG, and Vit D Hydroxy

# Quality Metrics TAT

## MICRO TAT VOLUME

### Bench/Molecular

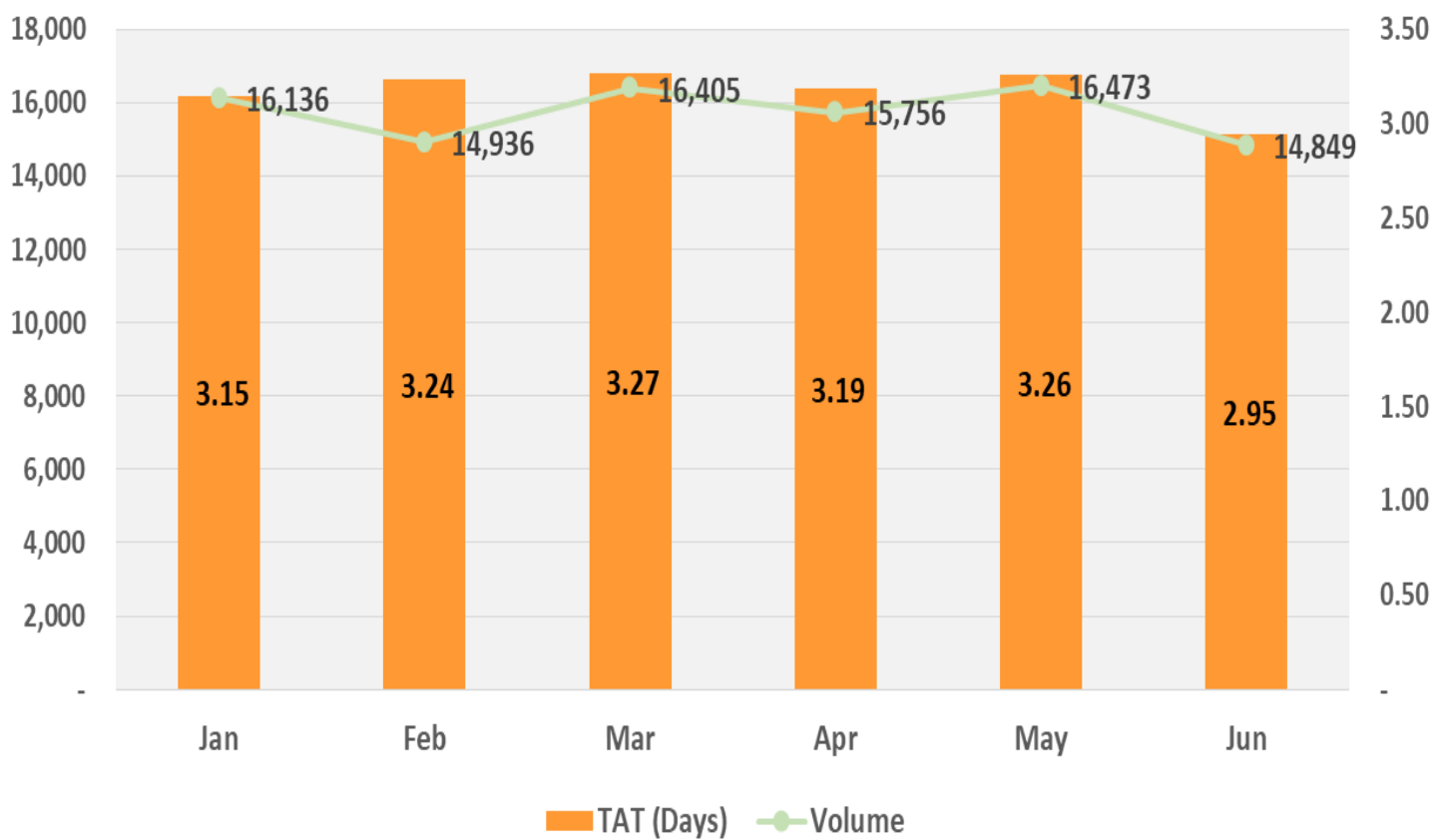
2019 Bench Tests Turn Around Times (hrs.) and Volumes



**14.5 HRS AVG TAT**

### Culture

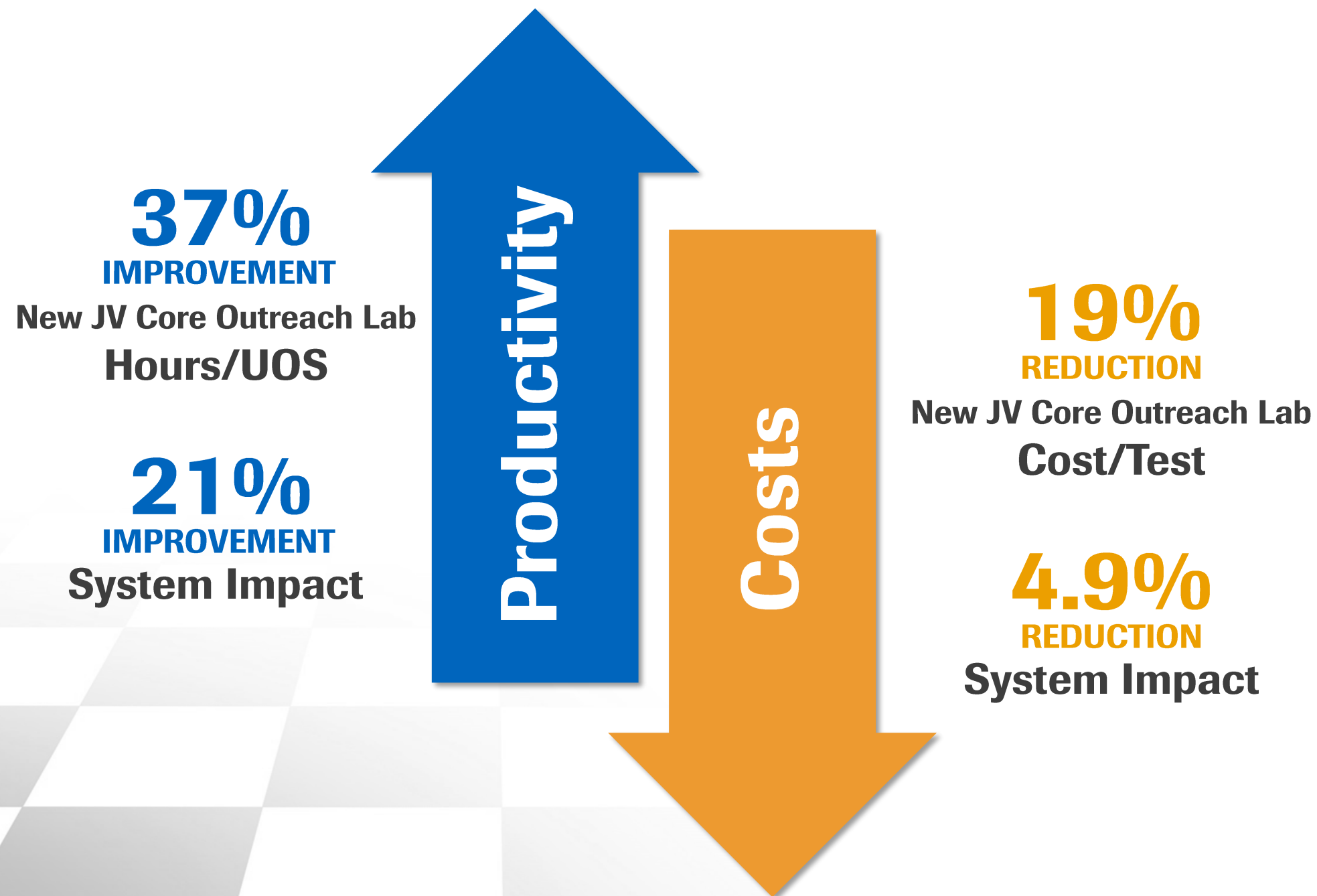
2019 Micro Culture Turn Around Times (Days) and Volumes



**3.18 DAYS AVG TAT**

# Summary Performance Targets

Outreach volume Increased by  
**2 million tests/year**



**Quality  
Metrics  
Standardized**

- ✓ TAT
- ✓ Critical Notification
- ✓ Specimen Exceptions
- ✓ Shift Reports
- ✓ Huddle Boards
- ✓ CLAC





# FINISH LINE?

*Who are we kidding – Next Race*

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