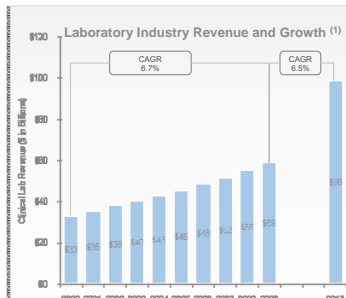


# Harnessing the Untapped Power of Information Systems to Support More Lab Capacity and Staff Productivity

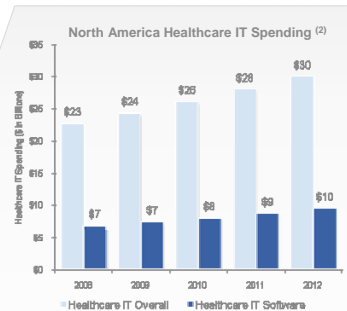
Kelly Feist  
November 2010



## The Intersection Of Two Multi-Billion Dollar Markets



- The U.S. clinical laboratory testing market has demonstrated acyclical, sustained and strong growth
- Increases in testing are largely driven by
  - A growing, aging and wealthier population
  - Evolution in personalized medicine and a growing array of esoteric tests
  - Technology advances in early diagnosis and treatment
  - Focus on prevention and wellness



- Spending on Healthcare IT continues to outpace general IT spending
  - The Healthcare IT Software market is expected to reach ~\$10bn by 2012 (8.4% CAGR from 2008)
- This substantial market opportunity reflects a broad push from the healthcare industry to reduce healthcare costs, automate healthcare delivery and improve patient safety

© 2010 Sunquest Information Systems, Inc.  
(1) Source: Washington G-2, Lab Industry Strategic Outlook, Market Trends & Analysis 2009.





## Lab Tests are the Best Bargain in Healthcare!

- All of this value only costs pennies.
- Laboratory testing/pathology services typically cost only 2¢ to 3¢ of every healthcare dollar!
- Significantly, sophisticated use of information technology enhances the value of lab test data.

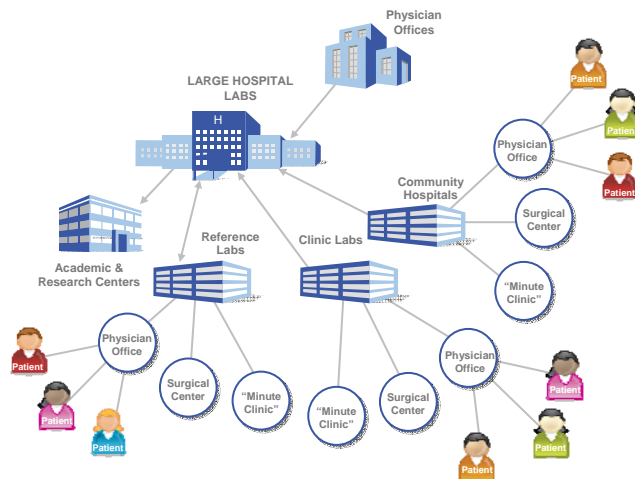
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## Lab Is Central To Patient Diagnostics

### Lab Is A Strategic Asset


- Integrates Vital Data
- Contributes to 70% of Diagnostic Decisions <sup>(1)</sup>
- Meets Pay-for-Performance and Joint Committee Quality Measures
- Ensures Patient / Physician Satisfaction
- Pioneers Predictive and Personalized Medicine
- Leads the Convergence between Clinical and Anatomic Pathology



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# Diagnostic Workflow Excellence Is Core To The Future Of The Laboratory




**Diagnostic Workflow Excellence**

Sunquest Laboratory Information System

- Sunquest is the undisputed leader in diagnostic workflow excellence with a 30+ year track record of providing comprehensive, robust and efficient clinical laboratory information systems
- Demonstrated ability to drive cost efficiencies, improve quality of care and enable healthcare organizations to increase revenue

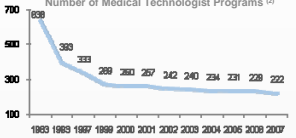
### A Robust Workflow Excellence Solution is Key to Ensuring Reliable Collection and Management of Lab Data

Lab Tests Per Person Per Year <sup>(1)</sup>



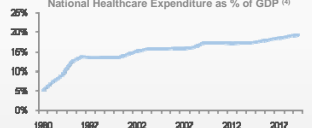
- Utilization of lab tests increases dramatically for 65+ year old people
- 80 million baby boomers today are rapidly advancing into this age cohort

Number of Medical Technologist Programs <sup>(2)</sup>



- The U.S. is graduating 30% fewer lab practitioners than 10 years ago and 50% fewer than 20 years ago <sup>(3)</sup>
- Shortage of medical lab personnel demonstrates an urgent need for continued improvement in workflow automation

National Healthcare Expenditure as % of GDP <sup>(4)</sup>



- Rising U.S. healthcare costs continue to put pressure on hospitals to:
  - Maximize efficiency by increasing adoption of automation
  - Improve the quality of care in order to hold down overall healthcare costs

(1) Source: Opening keynote at the Executive War College, April 2010, by Robert Michel.  
 (2) Source: © 2010 Sunquest Information Systems, Inc.  
 (3) Source: American Society for Clinical Pathology.  
 (4) Source: IHS.



## Laboratory Workflow



Clinical Workflow?  
 Or “manufacturing” workflow that delivers a clinical product?



# Clinical Product Volumes

## Top 25 Highest-Volume Hospital Lab Facilities by Total Annual Test Volume

	Facility Name	City	State	Test Volume
1.	Cleveland Clinic	Cleveland	OH	21,049,716
2.	Baltimore Washington Medical Center	Glen Burnie	MD	16,834,084
3.	Lourdes Hospital Inc.	Binghamton	NY	15,490,434
4.	Johns Hopkins Medical Laboratories	Baltimore	MD	14,906,403
5.	Memorial Hermann City Hospital	Houston	TX	14,731,100
6.	Dynacare Northwest Inc. (Swedish Medical Center)	Seattle	WA	14,148,346
7.	Clarian Arnett Health System Inc.	Lafayette	IN	13,223,788
8.	A2CL-Wisconsin Central Laboratory (Aurora St. Luke's Hospital)	West Allis	WI	11,884,300
9.	Henry Ford Hospital	Detroit	MI	11,725,356
10.	New York Hospital	New York	NY	11,101,559

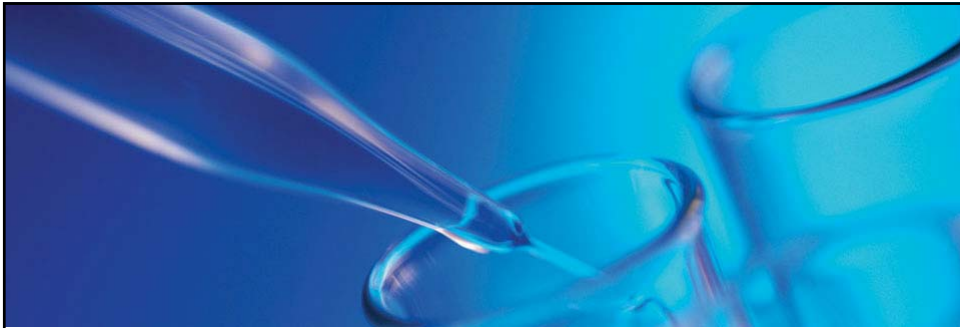
G2 Lab Industry Analysis 2010  
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# Automated Robotic Lines



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# Specimen Collection and Management



# Patient Safety Is At The Forefront Of Healthcare Priorities

Sunquest's point-of-care solutions help healthcare organizations achieve safe and effective patient care by delivering **ZERO ERRORS**

**Patient Safety is One of Nation's Most Pressing Healthcare Challenges**

U.S. Registered Nurse Supply vs. Demand ('000) <sup>(1)</sup>

Failure Type	Occurrence <sup>(2)</sup>
X Failure to ask stated name and match to wristband	57%
X Failure to match wristband ID with blood bag label	24%
X Failure to match wristband data with request form	46%
X Failure to check results of compatibility testing and expiration	27%
<b>Failure to do ALL 4 correctly</b>	<b>75%</b>

Nursing shortage is expected to intensify as baby boomers age and the need for healthcare grows  
 Nursing shortage, combined with an increasing workload, poses a direct threat to the quality of care (and potentially an increase in errors)

Eliminating preventable medical errors is key to improve quality of care and hold down healthcare costs
 

- Only 25% of blood test procedures are performed correctly across all four key steps
- 1/400 units administered to wrong patient

Negative payment incentives, industry initiatives like ASHP2015, and professional standards (e.g. CAP target benchmarks, Joint Commission safety and quality goals) are all driving patient safety as a top priority for hospitals

**CMS' "Never Events" effective October 2008, Medicare does not reimburse for care related to:**

- Object inadvertently left in after surgery
- Air embolism
- Blood incompatibility
- Catheter associated urinary tract infection
- Pressure ulcer (decubitus ulcer)
- Vascular catheter associated infection
- Surgical site infection-mediastinitis (infection in the chest) after coronary artery bypass
- Graft surgery
- Certain types of falls and trauma

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 (1) Source: U.S. Department of Health and Human Services.





## Bedside Barcoding: Pharmacy 2015

Recommendations by ASHP encourage hospitals to build on the foundation of bar coded medications advocated by the FDA. The ASHP Health-System

Pharmacy 2015 Initiative calls for 75 percent of hospitals to use machine-readable coding to verify medications before dispensing. The initiative also sets a goal that 75 percent of medications be automatically recorded prior to administration. The ASHP issued separate policy statements calling for all medications to be marked with machine-readable codes, and for pharmacists to take leadership in patient-safety efforts. A new JCAHO National Patient Safety Goal for 2006 requires labeling for all medications and medication containers. While JCAHO does not specifically require bar coding, the technology is an outstanding option because of the proven accuracy and safety benefits it provides.

### ASHP Policy Statement: Machine-Readable Coding and Related Technology (0308)

Source: *Council on Administrative Affairs*

To declare that the identity of all medications should be verifiable through machine-readable coding technology and to support the goal that all medications be electronically verified before they are administered to patients in health systems... To strongly encourage health systems to adopt machine-readable coding and point-of-care technology to (1) improve the accuracy of medication administration and documentation, (2) improve efficiencies within the medication use process, and (3) improve patient safety; these systems should be planned, implemented, and managed with pharmacist involvement and should be in all areas of the health system where drugs are used.

*This policy supersedes ASHP policy 0204.*

## Preventable Adverse Events

One study found that 1 in 18 sample identification errors leads *directly* to an adverse event

*"Identification Errors Involving Clinical Laboratories: A College of American Pathologists Q-Probes Study of Patient and Specimen Identification Errors at 120 Institutions"*

Archives of Pathology and Laboratory Medicine: Vol. 130, No. 8, pp. 1106-1113  
Paul N. Valenstein, MD; Stephen S. Raab, MD; Molly K. Walsh, PhD

Another study found a surprising 5.8 percent of phlebotomy samples are mislabeled

*"Phlebotomy Issues and Quality Improvement in Results of Laboratory Testing"*

Clin. Lab. 5+6/2006

GIUSEPPE LIPPI, GIAN LUCA SALVAGNO, MARTINA MONTAGNANA, MASSIMO FRANCHINI, GIAN CESARE GUIDI

## Older Processes – Identification and Labeling

- Matching pre-printed labels to patient samples
- Use of “generic patient labels”
- Hand written labels
- Risk of mislabeling
  - High
- Risk of not performing the Right test
  - High
  - Testing delays to match orders to samples
  - Add on testing not labeled



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## Point of Care Solutions Improve Patient Safety



Information Systems, Inc.

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## Process Changes

### Old

- Batch collections
- Calling/paging for Stats
  - Generic patient labels
- Lab generated label printing
  - Visual patient identification

### New

- Real time lists
- Automatic real time notification
- Bedside label printing
- Visual and electronic identification (Patient bar coded armband)

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## Significant Return on Investment

### Reduce specimen collection time

Productivity Benefit	Support	Benefit Calculation	Pre	Post	Diff
Reduce specimen collection time.	With Collection Manager labels can be printed right at the bedside so no time is spent traveling back and forth for labels. It can also immediately notify when a new test request comes in, eliminating the need to check-in with the lab, and once the specimen bar code is recorded in the device the specimen is automatically received into the LIS.	Time spent traveling to/from lab /hour/day (mins) # of phlebotomists Hourly cost per phlebotomist Time spent on specimen receipt /hour/day (mins) # of lab techs Hourly cost per lab tech <b>Annual Benefit</b>	15 12 \$ 21.70 10 35 \$ 31.00 \$ 464,322	6 12 21.70 - 35 31.00 \$ 49,164	9    10   <b>\$ 415,159</b>
<b>Validation of Key Assumptions</b> <b>Time spent traveling to/from lab</b> - Reduced travel time from 15 minutes per hour to 5 (Hospital B). 50-60% of time spent on traveling reduced to 10-15% and time per collection reduced from 40 minutes to 15 (Hospital H). Reduced travel time by 60% in the ED (Hospital J). <b>Time spent on specimen receipt</b> - 10-20 minutes an hour spent on manual receipt eliminated (Hospital B). 3-5 minutes per test eliminated (Hospital H). <b># of phlebs</b> - Reduced phlebotomist FTE by 4 or 10% (Hospital H), reduced FTE by 3 (Hospital K).					

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# Significant Return on Investment

## Increase ED capacity by reducing TAT

Revenue Benefit	Support	Benefit Calculation	Pre	Post	Diff		
Increase emergency department capacity by reducing TAT.	With Collection Manager the risk of mislabeled specimens is significantly reduced or eliminated, as the device can be used to scan a wristband and print a set of labels to identify "draw and hold" collections prior to the order being placed in the LIS. Once the order is placed specimens can quickly be sent to lab.	# of ED patients per day	80	80			
		Average LOS per patient (in minutes)	220	210	10		
		New capacity created - # of added patients possible			4		
		% of new capacity captured		10.0%			
		Average charges per patient in the ED	\$ 1,896	\$ 1,896			
		<b>Annual Benefit</b>	<b>\$ 55,363,200</b>	<b>\$ 55,626,834</b>	<b>\$ 263,634</b>		
		<b>Validation of Key Assumptions</b>					
		<b>Average LOS per patient</b> - Reduced average LOS in the ED by 10-20 minutes a person, CM accounts for 50% of this (Hospital J).					
		<b>Average charges per patient</b> - Average charges per ED visit \$1,896 (Consumer Health Ratings Study).					

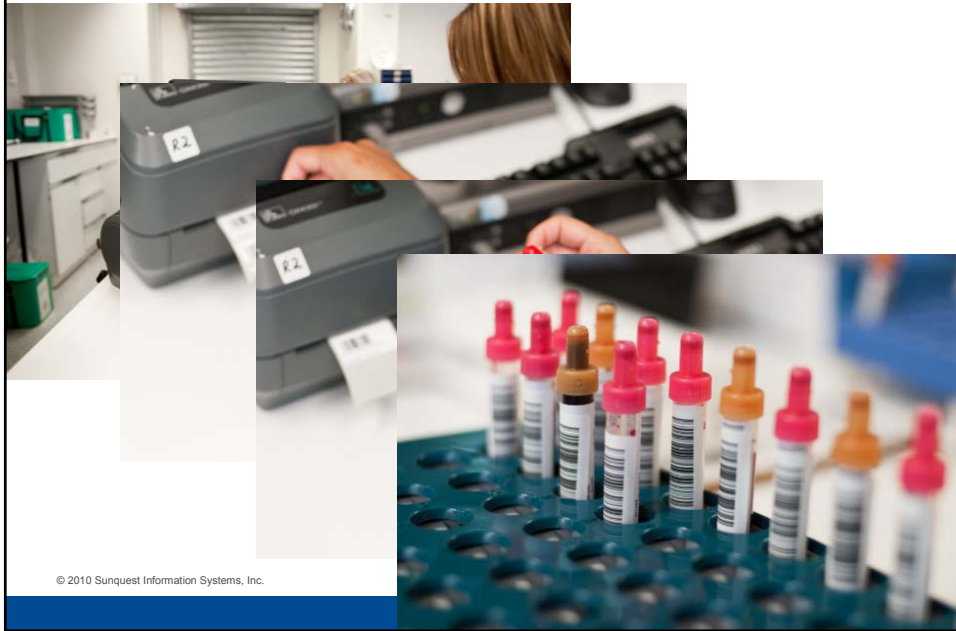
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# Accessioning and Planning



## Does This Look Familiar?



## Workflow Automation Opportunities

- Receipt of “Foreign Specimens” into the lab without the need to re-label
- Prospectively ***plan and route*** samples through the lab to optimize capacity and decrease turnaround time

## Evolution of the LIS into an ERP Solution

## Evolution of the LIS into an ERP Solution

- Decrease the possibility of errors resulting from the re-labeling process
- More than simply tracking the progress of a sample through the lab
- Prospective routing and expanded capacity provide opportunities to drive additional profitable revenue

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## Increased Productivity Delivers ROI

### Reduce time spent handling outside samples

Productivity Benefit	Support	Benefit Calculation	Pre	Post	Diff
Reduce time spent by lab technicians dealing with outside samples and manually re-labeling them to be recognized by their lab.	Sunquest Lab's Advanced Accessioning lets you receive outside samples with a barcoded identifier already affixed, and gives you the ability to read that code (the "Foreign CID") into the system and utilize it as the Sunquest Container ID.	# of outside samples w/foreign ID received a month Average time spent handling these (mins/sample) Lab tech FTE costs per hour Other re-labeling costs (labels, printing, etc)/mth <b>Annual Benefit</b>	50,000 5 \$ 31.00 \$ 1,000 \$ 1,562,000	50,000 1 \$ 31.00 \$ - \$ 310,000	4 \$ - \$ 1,000 \$ 1,252,000
		<b>Validation of Key Assumptions</b>			
		Average time spent handling outside samples - Currently 5-10 minutes per outside sample when received into the lab (Industry Benchmark).			

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# Increased Productivity Delivers ROI

## Reduce manual intervention required by techs

Productivity Benefit	Support	Benefit Calculation	Pre	Post	Diff
Reduce manual intervention required by techs to walk specimens from station to station.	With SMART, based on pre-defined criteria a specimen can be placed on the track, be received in the LIS, be pre-processed as needed, including complex aliquot instructions, and centrifuging, put on the instrument, processed and results acquired all without a tech looking at it.	# of tests per month Time spent manually handling specimens (mins) Lab tech hourly FTE costs <b>Annual Benefit</b>	500,000 5.0 \$ 31.00 \$ 1,550,000	500,000 3.5 \$ 31.00 \$ 1,085,000	1.5 1.5 \$ 465,000
<b>Validation of Key Assumptions</b>					
<p><b>Time spent manually handling specimens</b> - Time spent handling specimens reduced by 30% resulting in ability to increase volume by 30% with no added FTE(Hospital B). Time spent walking specimens from station to station reduced from 3-4 minutes to 0 and time to enter specimens into the system reduced from 5 minutes to 0 (Hospital F).</p>					

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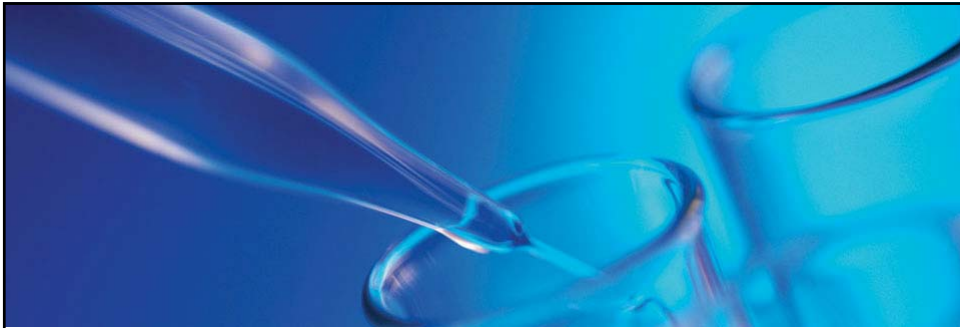
# Capacity Enables Revenue Generation

## Increase lab capacity by reducing TAT

Revenue Benefit	Support	Benefit Calculation	Pre	Post	Diff
Increase lab capacity by reducing TAT.	Route optimization logic determines each container's optimal path through accessioning, processing, and testing workstations, getting it to the workbenches more quickly where staff can quickly locate containers, view instructions, conduct testing and generate reports.	# of tests run per month Current TAT (in minutes) New capacity created - # of new tests possible % of new capacity captured Average revenue per added test <b>Annual Benefit</b>	500,000 45 214,286 40.00 \$ 240,000,000	500,000 32 214,286 40.00 \$ 241,028,571	14 14 \$ 1,028,571
<b>Validation of Key Assumptions</b>					
<p><b>Current TAT (in minutes)</b> - TAT per specimen reduced from 30 minutes to 2 (Hospital B), TAT reduced by 30% and capacity increased by 40% (Hospital F).</p> <p><b>Average revenue per added test</b> - Average revenue per test \$50 - \$80 (Hospital B), \$40 - \$80 (Hospital F), average hospital revenue per patient \$2,800 (RedOrbit News 2007).</p>					

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# Results and Reporting

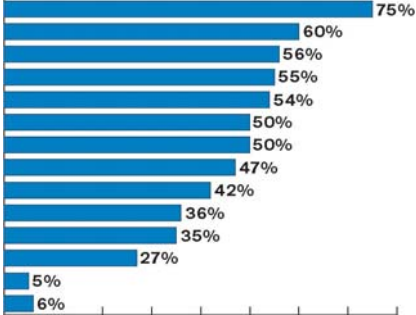


## Reporting? Or Decision Support?

Which of the following key benefits does your organization currently derive or would you expect to derive from business analytics software?

**Top Three Answers:**

- *Improving the decision-making process (e.g., quality and relevancy of decisions)*
- *Speeding up the decision-making process*
- *Better align resources with strategies*
- *Realizing cost efficiencies*



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## Business Intelligence and Analytics

- Accurate diagnostic KPI tracking
- Cost reductions through improved operations
- Real-time alerts
- Identify Trends and Proactively Address
- Guide organization to make data driven decisions
  - Increase organizational transparency
  - Increase patient safety

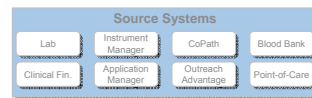
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## Sunquest Diagnostic Intelligence

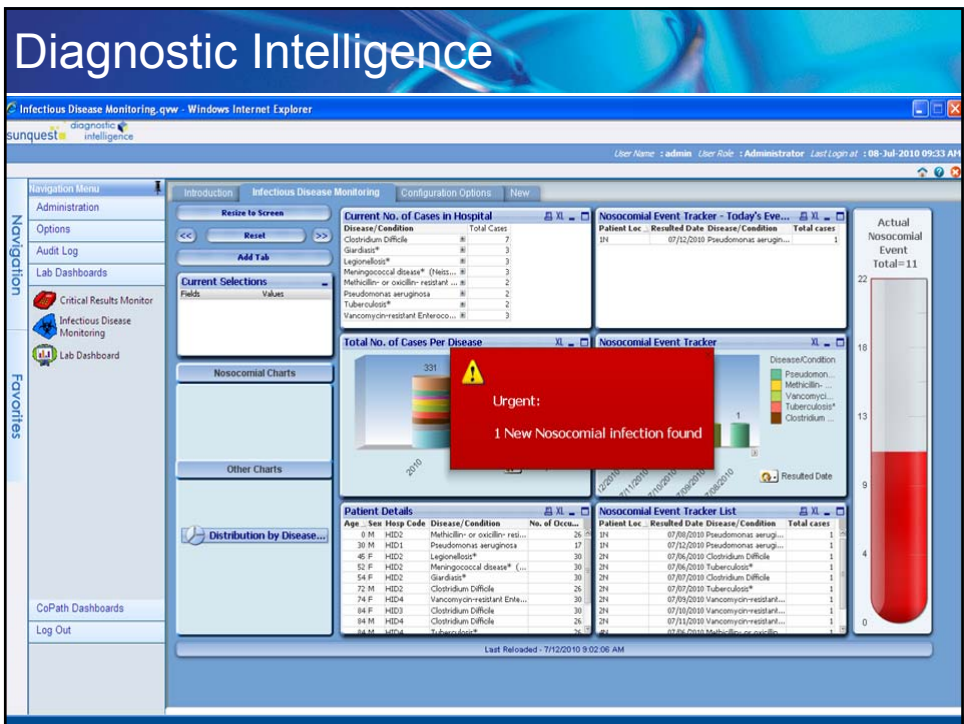
*The Sunquest Diagnostic Intelligence solution enables laboratories to drive key decision making with real-time diagnostic intelligence technologies*

- Provides real-time business, clinical and operational tools displaying actionable information in user defined dashboards
- Diagnostic Intelligence delivers metrics for laboratory operations to report on issues such as time and attendance, productivity, quality assurance, critical results and infectious disease
  - Provides accurate and actionable metrics to help monitor and manage the potential outbreak of infectious diseases
- Sunquest Diagnostic Intelligence also allows laboratories to monitor the financial and operational health of the business

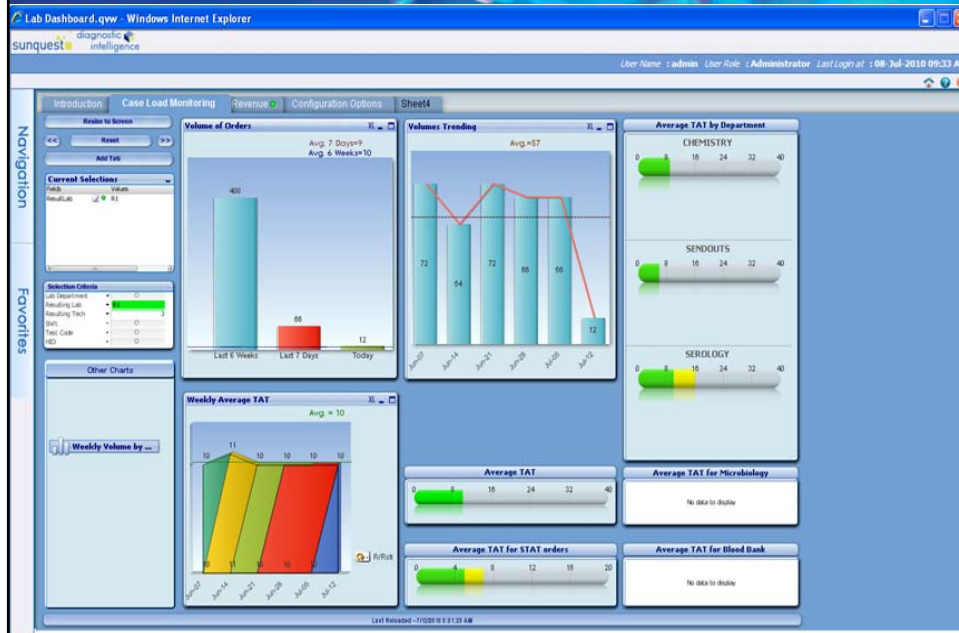


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# Diagnostic Intelligence



## Concluding Thoughts

- Lab workflow is unique within healthcare
  - Clinical product
  - Extremely high volumes delivered with high degree of accuracy
  - Automation is key to efficiency
- LIS is evolving to begin to deliver ERP functionality
- ROI is measureable and repeatable and helps articulate the objective value
- Metrics...Business Intelligence...is key to effective data driven management