

### New Analytics & Automation in Limited Spaces: Principles for Best Practice Lab Design





#### **Best Practice Lab Design**

Critical Design Considerations



#### PEOPLE

Success depends on adoption by the whole team



#### PROCESS

He who touches least wins.....Maybe

#### **INFORMATION**

Creating & moving information is the job, optimizing delivery of service is the goal



#### **Key Objectives** *Best Practice Lab Design*





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#### **Dagen Högertrafik** *Are We Ready for Change?*





*The day in 1967 that Sweden changed from driving on the left-hand side of the road to the right.* 

#### The Impact of Change on ROI



How Much of Your Success is Dependent on Operator's Adoption?



## The ADKAR Model



#### Organizational Change is the Sum of Individual Change



#### **Key Objectives** *Best Practice Lab Design*





#### The Art of Optimizing Workflow



Reduce TAT and Errors

## **Multiple Touches, Multiple Steps** TAT Errors he who touches least wins!

Analytics, Automation, & Floor Plan



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Analytics, Automation, & Floor Plan





Lean Flow in the non-Automated Lab





*Lean Flow in the non-Automated Lab* 



Opportunity

Optimize Staff Allocation, ID & Minimize Wait States, Drive Visual Controls & Leverage LOS to Eliminate Batch Process



Analytics, Automation, & Floor Plan





Analytic Consolidation, TAT, & Horsepower

#### **Analytic Consolidation**

- Touches, Cost, & Space- More Analyzers Means More of Each
- Vendor Standardization- Same as Above w/ Single Contact Point

- On Board Turn Around Time
  - Test Mix & Capacity at Receipt



12 Min at the 90<sup>th</sup> Percentile



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- On Board Turn Around Time
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  - 1 Line Down
  - Maintenance Schedule
  - Growth



## Challenge

Detailed Quantitative Analysis and Simulations are Necessary to Tailor the Analytic Solution to Your Specific Objectives

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### Managing Capacity, Capability, & Flow

Analytics, Automation, & Floor Plan





Automation Functionality

**Capabilities:** Every Touch Drives TAT, Quality, Productivity & <u>Design Space</u>

- In Lab Receipt- Does the Automation & Your IT Infrastructure Support?
- Multiple Disciplines Chem, Heme, Coag, & Reference?
- Multiple Sample Types- Serum, Plasma, PPP, Whole Blood, & Body Fluids?
- Multiple Tube Sizes- Choose One or Support All?
- Screw & Push Cap Recapping- In lab storage vs. Full Send-Out Processing?
- Stat Processing- Both Automation & Analytics?
- Centrifugation- Chemistry & Coagulation?
- Sample Quality- Tube/ Test Match & Hemolysis, Icterus, and Lipemia?
- Add-On & Refrigerated Storage- One Choice or Two?

**Capacities & TAT:** The Same Detailed Quantitative Analysis and Simulations are Necessary to Tailor the Automation Solution to Your Specific Objectives



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**Capacities & TAT:** The Same Detailed Quantitative Analysis and Simulations are Necessary to Tailor the Automation Solution to Your Specific Objectives

Opportunity

Careful Design that Exploits the Available Capabilities Can Liberate Existing Workstation Space for Use w/ Automation

Analytics, Automation, & Floor Plan



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Floor Plan & Configuration Trade Offs

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#### **Trade Offs: Automation Systems Specifications**

- Service Space
- Track Lengths
- Connection Points
- Direction of Flow



Challenge

Each of These Categories, Common to All Manufacturers, Can Present Significant Trade Offs to Space and Flow

# Managing Capacity, Capability, & FlowFloor Plan & Configuration: Example Design Challenge



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# Managing Capacity, Capability, & FlowFloor Plan & Configuration: Example Designed Process Flow



# Managing Capacity, Capability, & FlowFloor Plan & Configuration: Example Actual Process Flow



ChallengeOutgrew Design Capacity In 5 yrs.Added IA Analyzers for ID Testing

Expansion Plans Driving Even More Growth Needs to Fully Standardize Pre-Analytics

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# Managing Capacity, Capability, & FlowFloor Plan & Configuration: New Design Example Lab





# Managing Capacity, Capability, & FlowFloor Plan & Configuration: New Design Example Lab



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Floor Plan & Configuration: New Design Example Lab

Capabilities: Every Touch Drives TAT, Quality, Productivity & Design Space

In Lab Receipt- Transitioned to a New LIS w/ Unique ID & All Inpatient to are pre-Accn'd.

•Multiple Disciplines- Consolidate and Expanded Chem, Heme Delivered in Analyzer Racks, Coag Spun and Delivered, & Reference Testing Aliquotted, Labeled, Screw Capped for Tx.

•Multiple Sample Types- Serum, Plasma, PPP, & Whole Blood.

•Multiple Tube Sizes- 13x75mm up to 16x100mm Onboard.

•Recapping- Push Caps for In lab storage & Screw Caps for Send-Outs.

•Stat Processing- Multiple Levels on Automation & Analytics.

•Centrifugation - Chemistry & Coagulation.

•Sample Quality- Tube/ Test Match & Hemolysis, Icterus, and Lipemia. on Automation.

•Add-On & Refrigerated Storage- Add-On Buffer Accommodates Rolling 8 Hour Availability. Capacities & TAT: Extensive Modeling w/ Multiple, 5 Day LIS Data Sets to Assess Capacity , Model Growth, & TAT

#### **Key Objectives** *Best Practice Lab Design*







What Segments of TAT is your Design Controlling?



Receipt Onboard Auto to Result Release w/ Extensive Autoverification



What Segments of TAT is your Design Controlling?





What Segments of TAT is your Design Controlling?





What Segments of TAT is your Design Controlling?



## OPPORTUNITY

Every Touch Drives Variation & Increased TAT Drive to Receipt Onboard Automation & Maximum Autoverification to Deliver Optimum TAT to Physicians

## **Gaining Control of TAT**



New Automation & Analytics Example- LIS Data Analysis

Background

- 3 M Chemistry & Immunoassay Tests per Year
- Live on cobas 8100 & cobas 8000s ~ 10 months
- ED not Equipped w/ Remote Accessioning Devices
- All ED Testing Manually Received, Transported & Loaded on c8100
- Extensive Autoverification







90th Percentile	0:43
Average	0:34
Median	0:31
Ν	343

## **Gaining Control of TAT**



New Automation & Analytics Example- Audit Analysis

Audit Analysis

- 5 Day Parallel Operational Data from Cobas 8100 & Cobas 8000s
- TAT Analysis- Tubes Loaded on Input Buffer to Result Available



## OPPORTUNITY

Clearly Understand the Components of TAT that Your Design is Controlling.... If it's Unacceptable, Change the Design

#### **Key Objectives** *Best Practice Lab Design*





## Summary



#### Incorporating Best Practice into Lab Design

- Manage the Change w/ the Entire Team
  - Engage w/ a Partner who's Standard Practice Incorporates Change Management in the Assessment Process & Project Plan
- Quantitatively Define the Desired Level of Service Delivery
  - "What Does Good Looks Like"- Use it as the Project's Guiding Objective
- Analyze, Simulate, & Repeat
  - Engage Your LIS Manger- Become the Expert on your Testing Demands
  - Engage Senior Leadership- Surprise Growth is not Comfortable
  - Engage a Partner who's Nimble and Armed w/ the Most Accurate & Comprehensive Analysis Tools
- Design Associated Manual Processes to Support Automation & Analytics
  - Automating an Inefficient Process Can Lead to an Inefficient Automated Process

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Critical Design Considerations



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## Doing now what patients need next