“Is Your Lab Ready to Ride the Wave as Information Technologies Converge in Support of Integrated Diagnostics?”

Executive War College 2019
Session learning objectives

Understand key points to consider before bringing new technologies into your lab

Learn from industry peers to improve adoption success

Develop a roadmap that helps support the implementation do's and don’ts
Why ride the emerging wave of integrated diagnostics?

- Healthcare more complex and specialized
- Precision Medicine adoption
- Reimbursement and cost pressures
- Interoperability of patient data
- Data security, patient privacy
- Resource and staffing pressures
- Business demands, customer needs
  - Improve population health
  - Enhance patient experience (quality, safety, satisfaction)
  - Lower cost of care
  - Enhance clinician & staff satisfaction

Quadruple Aim
Selecting integrated diagnostics technologies
Sea of integrated diagnostics related technologies to consider

- Blockchain
- Circulating Tumor Cells (CTC)
- Gene Panels
- Artificial Intelligence
- Molecular PCR
- Next Gen Sequencing
- AP / Molecular Integration
- AP / Digital Pathology
- Structured Data
- Voice Recognition
Develop a process to assess and implement new technologies

- Identify & Research
- Build a Business Case
- Select Targets & Plan
- Implement & Measure
Develop a process to assess and implement new technologies

- Identify & Research
  - Create your portfolio of promising technologies
  - Review industry maturity models
  - Review white papers
  - Talk to and visit current users

- Build a Business Case

- Select Targets & Plan

- Implement & Measure
Create a portfolio to track your watch list

<table>
<thead>
<tr>
<th>Technology</th>
<th>Customer Demand</th>
<th>Cost to Implement</th>
<th>Potential Revenue</th>
<th>Additional Data…</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gene Panels</td>
<td>L</td>
<td>$$$$$</td>
<td>$</td>
<td>…</td>
<td>From Scorecard</td>
</tr>
<tr>
<td>Molecular PCR</td>
<td>M</td>
<td>$$$</td>
<td>$$$$$</td>
<td>…</td>
<td>From Scorecard</td>
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<tr>
<td>Structured Data</td>
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<td>$$</td>
<td>$</td>
<td>…</td>
<td>From Scorecard</td>
</tr>
<tr>
<td>Voice Recognition</td>
<td>N/A Internal</td>
<td>$</td>
<td>N/A Internal</td>
<td>…</td>
<td>From Scorecard</td>
</tr>
</tbody>
</table>
Look for maturity models – plan a phased adoption approach

<table>
<thead>
<tr>
<th>STAGE</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>7</td>
<td>Personalized medicine &amp; prescriptive analytics</td>
</tr>
<tr>
<td>6</td>
<td>Clinical risk intervention &amp; predictive analytics</td>
</tr>
<tr>
<td>5</td>
<td>Enhancing quality of care, population health, and understanding the economics of care</td>
</tr>
<tr>
<td>4</td>
<td>Measuring and managing evidence based care, care variability, and waste reduction</td>
</tr>
<tr>
<td>3</td>
<td>Efficient, consistent internal and external report production and agility</td>
</tr>
<tr>
<td>2</td>
<td>Core data warehouse workout: centralized database with an analytics competency center</td>
</tr>
<tr>
<td>1</td>
<td>Foundation building: data aggregation and initial data governance</td>
</tr>
<tr>
<td>0</td>
<td>Fragmented point solutions</td>
</tr>
</tbody>
</table>
Talk to your peers, join industry associations
Develop a process to assess and implement new technologies

- **Identify & Research**
  - Create your portfolio of promising technologies
  - Review industry maturity models
  - Review white papers
  - Talk to and visit current users

- **Build a Business Case**
  - Assess key points required expertise, equipment, tech. maturity, change management, etc.

- **Select Targets & Plan**
  - Determine the business case for adoption

- **Implement & Measure**
  - Score them comparatively with a scorecard
Develop a scorecard and prioritize

<table>
<thead>
<tr>
<th>Factor</th>
<th>Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Technology Readiness (TR)</td>
<td>Still in research, no clinical trials</td>
</tr>
<tr>
<td></td>
<td>Still in research, trials in progress</td>
</tr>
<tr>
<td></td>
<td>Approved by regulatory bodies</td>
</tr>
<tr>
<td></td>
<td>Adopted by early adopters</td>
</tr>
<tr>
<td></td>
<td>Mainstream technology</td>
</tr>
<tr>
<td>Improve Population Health (PH)</td>
<td>Impacts a small % of patients</td>
</tr>
<tr>
<td></td>
<td>Impacts target group of patients</td>
</tr>
<tr>
<td></td>
<td>Impacts all patients</td>
</tr>
<tr>
<td>Enhance Patient Experience (PE)</td>
<td>Improves test draw experience</td>
</tr>
<tr>
<td></td>
<td>Improves test draw &amp; results experience</td>
</tr>
<tr>
<td></td>
<td>Improves test draw, results &amp; care experience</td>
</tr>
<tr>
<td>Improve Patient Safety</td>
<td>Error rate potential? # of manual steps?</td>
</tr>
<tr>
<td>Lower Cost of Care (LCC)</td>
<td>&lt; $100 per episode</td>
</tr>
<tr>
<td></td>
<td>$101 – 250 per episode</td>
</tr>
<tr>
<td></td>
<td>$251 - $500 per episode</td>
</tr>
<tr>
<td></td>
<td>$510 -1000 per episode</td>
</tr>
<tr>
<td></td>
<td>&gt; $1000 per episode</td>
</tr>
<tr>
<td>Enhance Clinician &amp; Staff Satisfaction (CSS)</td>
<td>Time savings amount? # of roles impacted? Address staff feedback?</td>
</tr>
<tr>
<td>Service Differentiation over Competitors (D)</td>
<td>All competitors have</td>
</tr>
<tr>
<td></td>
<td>Local, R., &amp; N. competitors have</td>
</tr>
<tr>
<td></td>
<td>Regional &amp; N. competitors have</td>
</tr>
<tr>
<td></td>
<td>Only National competitors have</td>
</tr>
<tr>
<td></td>
<td>No other competitors have</td>
</tr>
</tbody>
</table>

$$\text{Total weighted score} = 5 \times \text{TR} + 2 \times \text{PH} + 2 \times \text{PE} + 4 \times \text{CC} + 1 \times \text{CSS} + 3 \times \text{D}$$
Learning from your peers
Develop a process to assess and implement new technologies

**Identify & Research**
- Create your portfolio of promising technologies
- Review industry maturity models
- Review white papers
- Talk to and visit current users

**Build a Business Case**
- Assess key points required expertise, equipment, tech. maturity, change management, etc.
- Determine the business case for adoption
- Score them comparatively with a scorecard

**Select Targets & Plan**
- Develop a technology roadmap for top items
- Identify and staff required team(s)
- Build implementation plans with experts
- Score them comparatively with a scorecard
- Budget for capital and operational investments

**Implement & Measure**
- Collect before data
- Execute implementation plan
- Monitor progress with team
- Collect after data
- Review ROI

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## Case Study 1: AP + Molecular Integration

### Key Points to Consider

<table>
<thead>
<tr>
<th>Sample types</th>
<th>Testing volumes</th>
<th>Equipment size &amp; capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff expertise</td>
<td>Sample processing &amp; routing</td>
<td>LIS capabilities</td>
</tr>
<tr>
<td>Middleware requirements</td>
<td>Workflow steps &amp; automation</td>
<td>Results reporting approach</td>
</tr>
</tbody>
</table>

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Case Study 1: AP + Molecular Integration

Impact without integration

- Tedious manual HPV accessioning workflow
- Relation of HPV test results to Pap smear reports
- Pathologist and staff time and work dis-satisfaction
- Test turn-around time and costs
- Tests accessioned separately, creating extra steps, double cases

Source: Large not-for-profit U.S. based health system
Case Study 1: AP + Molecular Integration

- Savings of ~1 hour per day in pathologist time
- More satisfaction among laboratory professionals
- Reports to ordering physicians are customized to their preferences:
  - A consolidated report of HPV results and Pap smear results or release of preliminary report (Pap smear only)
- Integration with EHR established
- Eliminate double-accessioning, help reduce errors

Source: Large not-for-profit U.S. based health system
Case Study 2: AP & Digital Pathology

Top 5 reasons to implement Digital Pathology

• Increased productivity
• Improved quality and better outcomes
• Increase revenues
• Cost savings
• Become an innovation leader

Source: API Webinar “Driving Laboratory Efficiency and Effectiveness in Large Multi-hospital Systems” A. Parwani, Ohio State University Feb. 2019
Case Study 2: AP & Digital Pathology

- Validation of systems (including regulatory)
- IT interfaces between systems (LIS, DP, EHR)
- Current lab workflow
- Not all systems can do everything
- Cost

Source: API Webinar “Driving Laboratory Efficiency and Effectiveness in Large Multi-hospital Systems” A. Parwani, Ohio State University Feb. 2019
## Case Study 2: AP & Digital Pathology

<table>
<thead>
<tr>
<th>Use Cases</th>
<th>Historic vs. go forward slides</th>
<th>Equipment size &amp; capacity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Staff expertise</td>
<td>Image analysis &amp; reimbursement</td>
<td>LIS capabilities</td>
</tr>
<tr>
<td>Storage size &amp; access</td>
<td>Workflow steps &amp; notifications</td>
<td>Images on the Patient Report</td>
</tr>
</tbody>
</table>

### Key Points to Consider

- Use Cases
- Historic vs. go forward slides
- Equipment size & capacity
- Staff expertise
- Image analysis & reimbursement
- LIS capabilities
- Storage size & access
- Workflow steps & notifications
- Images on the Patient Report
<table>
<thead>
<tr>
<th>Key Result Areas</th>
<th>Impact Digital Pathology</th>
<th>Metrics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity and Efficiency</td>
<td>Workload balance, automation, improved workflow</td>
<td>Turnaround time</td>
</tr>
<tr>
<td>Quality</td>
<td>QA program, image sharing, remove site barrier to second opinion</td>
<td># Technical errors</td>
</tr>
<tr>
<td></td>
<td></td>
<td># Diagnostic errors</td>
</tr>
<tr>
<td>Innovation and Strategic Growth</td>
<td>New consult cases and partners Research opportunities (image analysis and predictive algorithms)</td>
<td># Consult cases # Partner institutions New tools # Patents, grants</td>
</tr>
<tr>
<td>Service and Reputation</td>
<td>Patient satisfaction Leadership in area Branding</td>
<td>Satisfaction scorecards</td>
</tr>
<tr>
<td></td>
<td></td>
<td># Papers/talks</td>
</tr>
<tr>
<td>Financial Performance</td>
<td>Revenue from new cases/patients</td>
<td>Cost savings Pull through revenue</td>
</tr>
<tr>
<td>Workplace of Choice</td>
<td>Improved conferences, education</td>
<td>Staff and faculty surveys</td>
</tr>
</tbody>
</table>

Source: API Webinar "Driving Laboratory Efficiency and Effectiveness in Large Multi-hospital Systems" A. Parwani, Ohio State University Feb. 2019
Case Study 2: AP & Digital Pathology Opps./Objections

Future directions

• New models of health care will focus on expense reduction and appropriateness/quality of care (makes great sense in a payer-provider network)
• Price of technology continues to decrease, capabilities continue to improve
• Physicians become increasingly comfortable with use of new modalities

Barriers faced

• Reimbursement
• Licensure and other regulatory issues
• Manual process and lack of standardization
• Unique infrastructure needs and increased costs

Source: API Webinar “Driving Laboratory Efficiency and Effectiveness in Large Multi-hospital Systems” A. Parwani, Ohio State University Feb. 2019
## Case Study 3: Next Gen Sequencing

<table>
<thead>
<tr>
<th>Use Cases</th>
<th>Panel design &amp; reimbursement</th>
<th>Staff expertise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Networking with peer labs</td>
<td>Maintaining content currency</td>
<td>LIS capabilities</td>
</tr>
<tr>
<td>Instrumentation &amp; connectivity</td>
<td>Systems integration</td>
<td>Results reporting approach</td>
</tr>
</tbody>
</table>

### Key Points to Consider
Case Study 3: Next Gen Sequencing

- Children's National Medical Center
  - Performing genetic tests for 8,000 patients annually
  - Go-live within 6 months, budget neutral in 12 months
  - Decisions on types of panels, instruments and software – and resource talent/skills
  - Software technology needed to link and automate entire process

Lesson learned: Genetic / Molecular testing is an area of growth that can be profitable. But it must be carefully managed, which requires the right software, workflow, and business approach. As with the other aspects of the lab, standardization and optimization are essential.

Source: Becker's Hospital Review Dec. 2018
Honing your implementation plan
Hanging Ten - Important implementation "Must Do’s"

• Focus on expertise, business cases and implementation plans for target use cases

• Stay involved in industry associations whose members are on the leading edge

• Ensure your LIS/LIMS system flexibility can handle the evolving workflows, such as digital pathology, molecular / genetics, etc.

• Measure the before and after results to support future technology investments

• Partner with vendors to develop your plans and stay current with technology innovation
Preventing a Wipe out - Important implementation "Don'ts"

- **Underestimate the expertise** and **resource required** to implement and run these programs, such as digital pathology or molecular & genetics testing

- **Overutilize one-offs, workarounds or customizations** as it multiplies upkeep effort

- **Underinvest in automation & system integration**

- **Forget about knowledge sharing & content provider access** to ensure information currency

- **Miss getting current staff involved in and excited for** the change efforts
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