

Automating the Un-Automatable:

Successful Strategies for Automating the Final Frontiers in Laboratory Medicine

Norma Page
Vice President, Clinical Operations



Driving Innovation in Lab Medicine

DynaLIFE_{Dx} (DL) has consistently offered a forward thinking approach during its history and continues to develop and implement innovative solutions.

We always strive to find new tools rather than increasing the number of hands we need to deliver our expanding volume and scope of service.



DL has developed many firsts in lab systems, including building and implementing Canada's first:

- Web based lab Patient Appointment System
- Wait Time Management system for laboratory patients
- Home Collection information system
- Region wide tracking system for laboratory specimens

We developed a novel, Patient-Centric, PSC Design that offers improved patient care with optimized LEAN workflow, supply management, etc.

We implemented the first Siemens LAB CELL Chemistry Automation System in North America



Our Strategy

We generally like to take big leaps forward adopting leading edge technology rather than taking multiple small steps.

Our management team and staff have adapted to this approach and bring a very positive attitude to the implementation of new and innovative systems/platforms.



How do we make the compelling argument – what do we look for?

- 1) A quantum leap in Quality
- 2) Positive impact to Patient Care
- 3) Improved Result TAT
- 4) Productivity Gains
 - Leaner workflow
 - Expanded automation
 - Changes to employee mix
 - Fundamental changes to cost structure

How have we successfully implemented Game Changing Technology?

1) Preparation and Planning is critical to success

- Communication – from the start to the finish, engaging the entire department and organization
- Build a solid cross functional core team
- Draw in key internal leaders
- Visit sites using the system
- Develop a strong technical team
- Having strong project leadership is key
- Mock Lab approach creates confidence

2) Focus preparations on the big launch

- Set a target
- Engage staff in planning and preparation steps
- System set-up and testing must be meticulous
- Optimization of SOPS and workflow
- Training, training, training – focused on requirements
- Develop confidence through training approach
- Mantra – failure is not an option...

3) Go live – the easy part

Why was the introduction of automation in Anatomic Pathology and Microbiology so important to us?

- We process 230,000 Histology specimens annually - 450,000 blocks, 850,000 H&E slides.
- We test 850,000 Microbiology specimens annually (40% acute care/60% Extended care and community)
- Opportunities to improve quality, patient care, patient safety, TAT and lab productivity – huge!

Transforming Histology

Roche Ventana Vantage Specimen Tracking /
Quality Management System

- Implemented across 5 integrated sites – our Base Lab and 4 Acute care hospital laboratories

Five automated Symphony H&E stainers and Two automated Specials Stainers

- Implemented at Base Lab

With the support of 40+ Pathologists and 100+ lab staff across the five sites



Why? Key Driver was Patient Safety

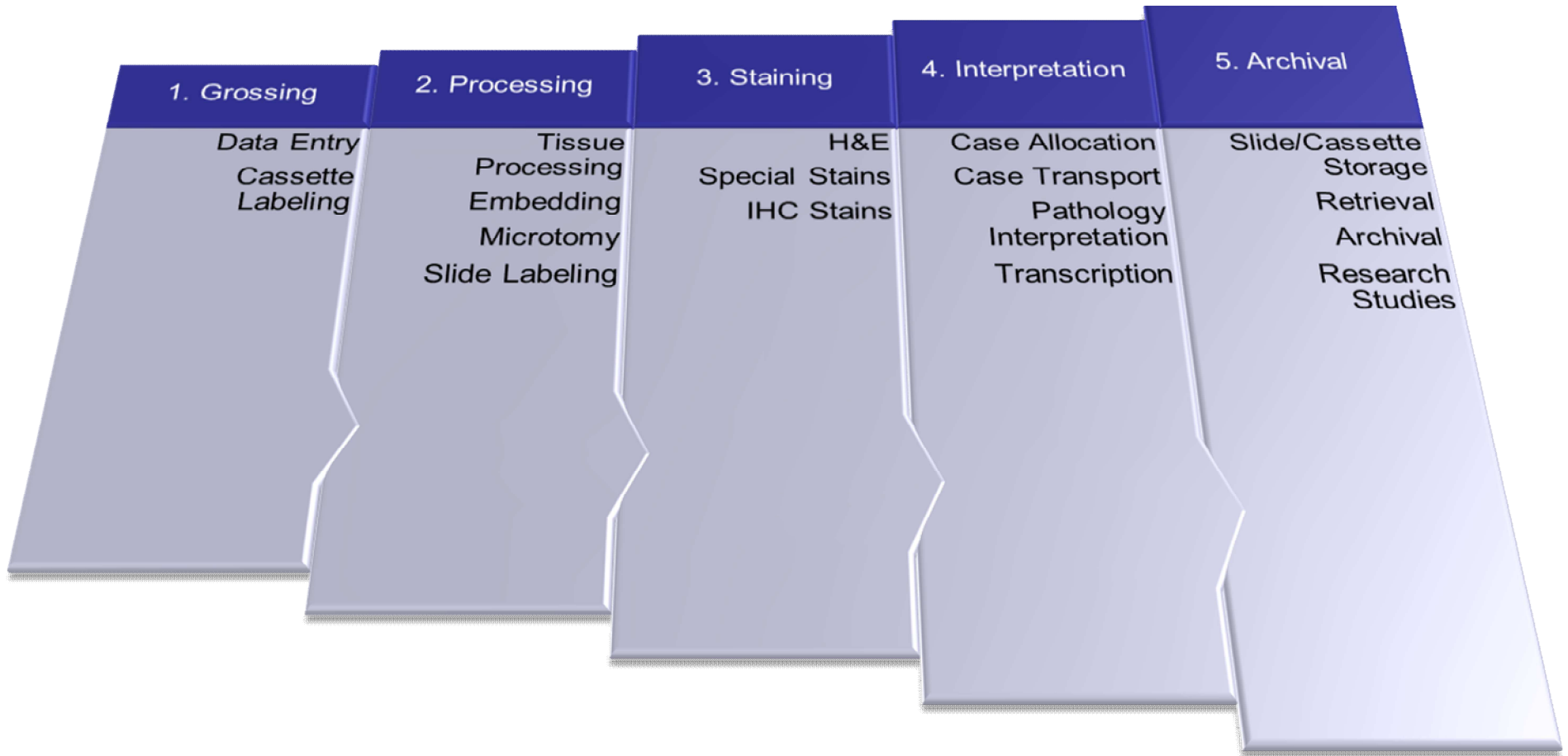
AP adverse events are primarily a result of specimen mix-ups at data entry, grossing, microtomy, pathologist interp or transcription.

- ✓ Eliminates pre-labelling of slides - single piece workflow
- ✓ Provides specimen chain of custody at each step
- ✓ Provides information access at each point in the workflow
- ✓ 2D barcoding eliminates reliance on vigilance at each process step eliminating memory aids, logs and checklists
- ✓ Standardization and simplification of process and design to limit hand-offs and build in Quality Assurance and Quality Control monitoring into each function

Operational Benefits – supports LEAN workflow, improves TAT and enables productivity gains



The pieces of the puzzle....



Histology Specimen Receiving



Tissue Embedding



Slide Preparation



Symphony Automated Stainers



Case Assembly



Anatomic Pathology Mislabeled Blocks and Slides 2012

Time Period	Mislabeled Blocks	Total # of Blocks	Mislabeled Slides	Total # of Slides Cut
Annual		450,000		830,000
Quarter 1	95	105,000	21	190,000
Quarter 2	85	105,000	37	190,000
BEFORE	90		58	
Quarter 3	0	120,000	6	215,000
Quarter 4	2	125,000	3	240,000
AFTER	2		9	

Productivity Gains:

One month following the system launch in June 2012 we absorbed a 15% increase in volume from new referral work with no additional staff or negative impact to TAT.

Examples:

- Saved >1,000 hrs of pre-labelling, sorting
- Saved >5,000 hrs matching cases together

Mock Lab Approach

For our AP Project we used 20 linear feet of counter space, IT and Power drops in a small R&D lab away from the AP Department.

We mocked up each stage in our process:

- Receiving / Data Entry
- Grossing / Cassette Labeling
- Embedding
- Microtomy
- Case Assembly

1. We used equipment that would be redeployed from the Mock Lab to AP prior to implementation.
2. Staff from our partner hospital labs participated in training, workflow development, system testing and fine tuning with DL staff in the Mock Lab supported as sense of ownership in the new processes.
3. Away from their usual work environment with no workload pressure, in this separate and safe environment (no patient specimens or results at risk), staff have the opportunity to learn, brainstorm options, and develop confidence in the platform
4. As a result people, equipment and processes were ready and launch day was sublime!

Transforming Microbiology

Last summer, after completing an in depth analysis of the new world of Microbiology automation options we chose to implement the BD Kiestra system.

It has changed or facilitated changes to almost every component of our Microbiology laboratory. Our lab supports all but one of the hospitals in the Edmonton Zone along with extended care and community patients.



Microbiology Automation The BD Kiestra System



Key Advantages Provided by the Kiestra Automated System

The magic of the magnetic beads – this new and novel approach to streaking out the specimen following inoculation of the culture media allows for much better separation of each bacterial colony saving an additional day in the incubator and as a result can shorten TAT by a day.



Key Advantages Provided by the Kiestra Automated System

Culture Plate Management:

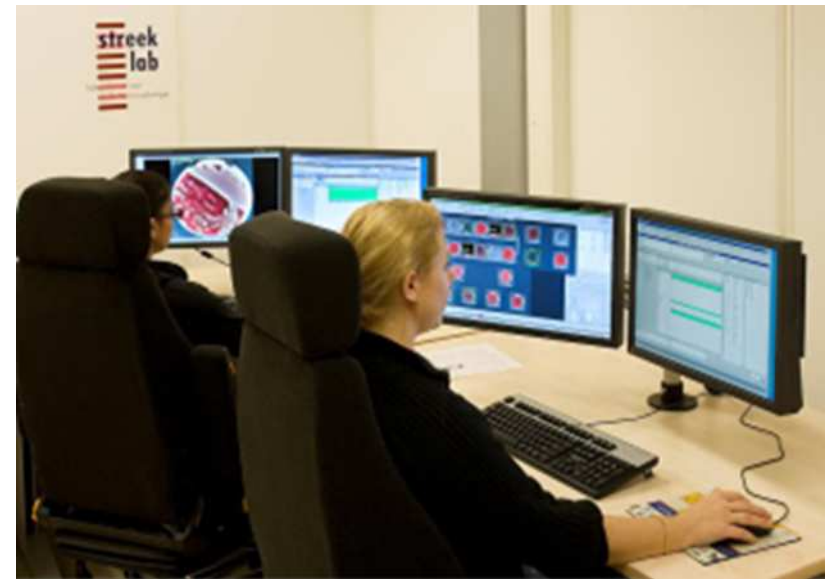
- Correct media is barcoded and transported via the track
- Each plate is sent to the appropriate incubation environment (CO₂, O₂, etc.)
- Bacterial growth captured via digital imaging at defined times optimizing quality of results
- Plates transported by track to benches for further work up
- Discard plates are also managed by the system



Key Advantages Provided by the Kiestra Automated System

Automated Digital Imaging:

- Bacterial growth is captured via digital imaging of plates at defined times
- Plates viewed by digital images at reading stations
- Digital Imaging enhances plate reading
- No Growth plates reported immediately
- Vision toolbox supported rapid assessment of MRSA plates



Our Reading Room

- Digital images of culture plates assessed by technologists
- Colonies identified for further work-up or Susceptibility testing
- Results reported



Key Advantages Provided by the Kiestra Automated System

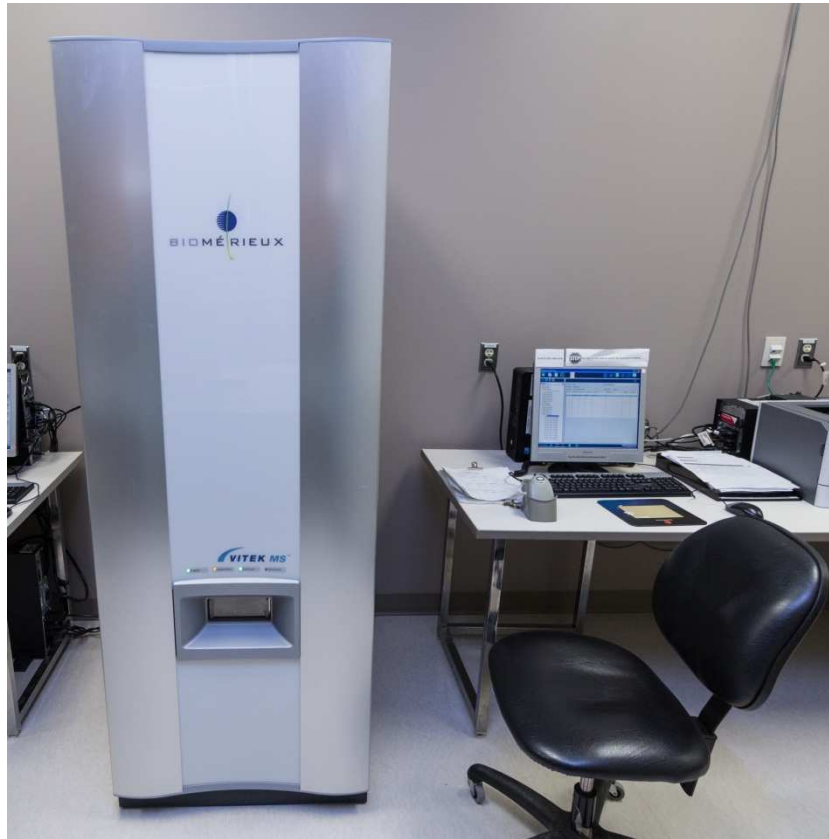
Smart Incubators:

- Based on our SOPs, each plate is imaged at the completion of its specified incubation time
- Improves the quality of the results as under or over incubation can interfere with colony isolation and pathogen ID



Supporting Systems

Maldi-Tof Pathogen Identification



Matrix Assisted Laser
Desorption / Ionization
Time-of-Flight:

- can identify over 2200 different bacterial pathogens
- complete the identification of a recognized pathogen under 1 minute

Supporting Antibiotic Stewardship

Our medical microbiologists are closely involved in provincial and local antimicrobial stewardship committees which seek to continually improve patient safety and outcomes by guiding appropriate use of antibiotics.

- Rapid pathogen identification and reporting will more effectively guide the decisions made by physicians supporting enhanced antibiotic utilization.
- In turn this will hopefully support the reduction of antimicrobial resistance through the establishment of strategies that limit the use of broad spectrum antimicrobial agents



Potential Benefit to Patient Care:

Traditional Microbiology	Primary Culture	Sub-Culture	Pathogen Identification	Antibiotic Sensitivity	Total time to Report
	24-48 hrs	24 hrs	24 hrs	24 hrs	4 - 5 days

Microbiology Automation	Primary Culture	Path ID and Susceptibility	Total time to Report
	18-24 hrs	20-24 hrs	1.5 to 2 days

Our BD Kiestra Mock Lab

- Bench top Inoqua and ImagA helped us set up our streaking patterns
- Bench layouts and workflows designed
- Design system set-up and layout planning
- Training on reading digital plate images and system software



Communication is Key to Success

- Our Expert User Team came up with this idea
- Daily stand up meetings as well as group meetings have been successful in engaging all staff
- Monthly Lab Report update provided by our CEO



Launch Day – First Specimens Loaded



Launch Day – Our Great Micro Team



 CANADA'S
BEST
MANAGED
COMPANIES


DynaLIFE_{DX}
Diagnostic Laboratory Services

Successful Strategy?

Begin with sharing the vision of the future that is meaningful to each person involved.

Have the courage to go for it - finding solutions for each hurdle along the way.



Questions?

