Using Camera Systems to Read Entire Batches of Barcodes & More

Lyman Garniss
Partners Healthcare Systems
Massachusetts General Hospital
Agenda

- AP Workflow challenges
- Some creative solutions
- Next steps in our designs with Sunquest
- Q & A
The Challenges in AP

- Anatomic Pathology (AP) Specimens are now or soon will be bar-coded with unique numbers
- Sunquest CoPath v. 5.0 can now track many asset types
- New regulations require the reporting of lost specimens in AP
- AP workflow is poor
- Pressure to increase productivity & accuracy
- AP work flow tends to work in batches
- Little to no automation in AP
Cassette Challenge

- Almost ALL AP departments retain their gross waste for 6 to 7 days
- Why? Because a cassette maybe lost in the medical waste and must be retrieved
- Now that is GROSS Pathology
It gets worse – The Government is now involved

- Washington, DC - The National Quality Forum (NQF) Releases Updated Serious Reportable Events (SRE)

  - Latest Update Includes Four New Events
  - Two of these directly affect Pathology Departments.
    - (NEW) Patient death or serious injury resulting from failure to follow up or communicate laboratory, pathology, or radiology test results
    - (NEW) Patient death or serious injury resulting from the irretrievable loss of an irreplaceable biological specimen
A Solution

- CoPath 5.0 knows how many cassettes were produced
- How can we EASILY check CoPath to ensure all cassettes that went into a given area are coming out together?
- Scanning each cassette is not efficient and could still lead to errors and/or lost materials
- Gross Techs are gloved – usually no computer workstation close by
Cognex Camera

- Cognex Camera systems are primarily used in manufacturing environments
- Isn’t Anatomic Pathology a manufacturing process? We make slides for Pathologists
- Cognex Camera systems include a camera with the processor built in. It can take a picture and then based on its configuration read the barcodes and send them to a system or program to be evaluated against the APLIS.
Cognex Camera
Barcodes are EVERY WHERE – now in Pathology!
Paradigm Shift

- The APLIS can now track and route specimens
- If the correct tracking spots are configured and the specimens scanned at those spots we should be able to know where everything is at any given point in time in the process.
- We have done this in the clinical lab for years
- This is new to Anatomic Pathology
Integration is the Key!

- “Scan” an entire rack of cassettes and alert the Gross Tech if any are missing in less than 5 seconds.
- Track work load when these materials are leaving the grossing area.
- Move cassettes from the Gross work list to the Processing work list in CoPath.
- Auto update CoPath to know the status of the cassettes.
Ready to Scan

- Color cassettes produced at MGH with 2-D barcodes generated by CoPath Plus v 5.0
- Placed in a standard rack used by AP
Cognex in Action

- The next slide shows the Cognex Camera system “selecting” the barcodes from the image.
- The data from the barcodes are displayed to the left.
- This data is sent to a file and read by a Boston WorkStation “operator“. They check the system for the related specimens and also move the specimens from one spot to the next in CoPath.
- The image capture, analysis and rendering of the barcode information occurs in a fraction of a second.
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Let’s zoom in closer

- A closer look at the image captured and data generated
The Check

- Using middleware (Boston Software) we can check the barcodes against what is in CoPath (the source of truth)
- If ANY are missing alert the Gross Tech. They must correct the batch or over ride the system
- Find the physical cassette w/ tissue or delete the missing (empty) cassette from CoPath
  - Find cassette in top layer of the bio bucket now & avoid the check of several containers days later
Next Steps – Full Integration

- Middleware is not ideal
- Work is underway to more closely integrate bar-code reading into CoPath – batch or serial scanning will work. Flexible for smaller volume
- We need to capture and record when errors occur by operator, time of day, complexity/size of specimen parts, etc
Cool – but what else can we do?

- Receive the batch into the processing area
- Track transport delays & workload
- Track a “newly created” batch of cassettes into a specific processor for future QA analysis
Next Steps

- Better integration with CoPath Plus
- Ability to record technician in processing area
- Better workload tools
- Automate worksheet updates
- Predictive modeling of workflow & time to process
Slides and Slide Folders

- 2-D bar-coded slide labels are generated when the cassette is scanned in Histology
- Workload by Histology Tech is tracked well today
- What is missing? What can be approved?
- Almost everything after the slide has been created & bar-coded
Slides and Slide Folders – The Challenges

- Handling of cassettes
- Handling/sorting of slides
- Manual QA check of cassette vs slide
- Time consuming process
- Takes up a lot of valuable space
- Repetitive handling of materials
- No precise/easy way to know what is missing and why
Slide Reconciliation
Slide Reconciliation
Slide with translated barcode info in Green

S11-898_1_3_1
Next Steps

- Tighter integration with CoPath
  - Ability to assign a “batch” of slides or a case to a bar-coded slide folder
  - Ability to associate the slide folder with a delivery date/time to a Pathologist via a bar-coded mail box
  - Ability to “check” in an entire slide folder into the slide library and check all slides in a second
What else can we do?

- Another manual/labor intensive & subjective process – Small Gross description
- At MGH this is dictated into an old fashioned dictaphone system
- We pay a 3rd party to transcribe the small gross description
- Delays in getting the report back
- Data dictated is subjective..
  - Tan-brown; brown-tan, etc…
- Tech with a ruler… how accurate?
Can we do it faster & better?

- The questions are asked – Small Gross
  - Why do we even do this?
    - The clinicians want it & “we have always done it this way“
  - How accurate is it?
    - As accurate as a human with a ruler can measure a small piece of tissue
  - What about the color descriptions?
    - Subjective from person to person
  - In summary…
    - We are paying to transcribe data of questionable quality for an unknown gain or value and there is a 24 hour delay in turn around time
  - IT guys love these kinds of scenarios…..
Let’s apply some technology

- Can a camera & a computer do this task?
  - Faster
  - More consistently
  - More accurately
  - Can we provide more data
  - Can we do it cheaper
  - Scientifically
  - In a structured format
Sample 1 Information (Object 0)
- Overall Length in cm: 1.017
- Overall Width in cm: 0.609
- Area in Square cm: 0.472

Sample 2 Information (Object 1)
- Overall Length in cm: 0.000
- Overall Width in cm: 0.000
- Area in Square cm: 0.000

Primary Colors as a Percentage of the Total Area
- Light Pink: 42.954%
- White: 31.792%
- Pink: 26.209%
- Dark Pink: 0.029%
- Brown: 0.016%
- Black: 0.000%
- Red Brown: 0.000%
What are we measuring?

- We now have the X & Y axis that we are measuring labeled on the image.
- The process of image capture, analysis and data output occurs in fractions of a second.
- No cost or delay in transcribing subjective data dictated by a small gross tech.
- No need for the small gross tech to dictate.
- Dictaphone out / smart camera in!
### Sample 1 Information (Object 0)
- Overall Length in cm: 1.017
- Overall Width in cm: 0.689
- Area in Square cm: 0.472

### Sample 2 Information (Object 1)
- Overall Length in cm: 0.000
- Overall Width in cm: 0.000
- Area in Square cm: 0.000

### Primary Colors as a Percentage of the Total Area
- Light Pink: 42.954%
- White: 31.792%
- Pink: 25.209%
- Dark Pink: 0.029%
- Brown: 0.016%
- Black: 0.000%
- Red Brown: 0.000%
Notes on Measurements

- We are measuring in centimeters (cm) to 3 decimal places of accuracy – More accurate/precise
- We are labeling (X/Y) what we are measuring
- Total area – new – based on true area not the product of length and width
- “Primary” colors as a percentage of the total area analyzed – not subjective but scientific
- We are measuring widest and longest axis
- We can and may measure shortest
- Fast to calculate the data – < 1 second
Sample 1 Information (Object 0)
- Overall Length in cm: 1.121
- Overall Width in cm: 0.766
- Area in Square cm: 0.606

Sample 2 Information (Object 1)
- Overall Length in cm: 0.686
- Overall Width in cm: 0.451
- Area in Square cm: 0.214

Primary Colors as a Percentage of the Total Area
- Red Brown: 76.162
- Brown: 11.663
- Black: 11.055
- Dark Pink: 0.673
- Pink: 0.448
- Light Pink: 0.000
- White: 0.000
What was “Red-Tan” or “Tan-Gray” is now a scientifically defined color based on measurements of Hue (color), Saturation & Intensity.

We can now “translate” this into a consistent description that can appear on the Pathology report – no transcription costs or delays.

We can also STORE the scientific data for research purposes.
Summary

- Batch reading of block and slide barcodes can improve quality/safety, measure productivity and save time & effort

- Photo analysis & data rendition of small gross specimens may lead to new highly accurate standards for small gross descriptions

- Photo analysis & data rendition of small gross specimens may save time and effort and improve turn around time

- Cheaper, better & faster
Closing

- Thank you all for attending
- Any Questions or Comments?

Lyman Garniss

LGarniss@Partners.org