

# A Detailed Critique of Whole Slide Imaging Solutions

Hardware and Software Used in a  
Network Environment

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# Outline of Topics

- Hardware
- Device control software
- Slide Handling
- Network requirements
- Image processing, Analysis
- Release software, meta data creation
- Storage
- Viewing software
- Analysis software

# Hardware

- Form factor
  - Size
  - Weight
  - Vibration sensitivity
- Loading
  - Front
  - Side
  - Automated
- Preventive Maintenance
  - Dust
  - Broken glass
  - Cleaning
- Durability

# Device Control Software

- Run setup control
  - Rack setup control
- Lock downs
  - Can't change run parameters
- Missing features
  - Live time viewing
- Fine tune controls are absent
- Little data output control
  - 3 or so file formats
- No true export functionality

# Slide Handling

- Mechanism
  - Drops
  - Breaks
  - Suction cups, pincers and slides oh my!
- Form factor impacts
  - Cover slip length
  - Slide weight?
  - Cover slip material
  - Label placement
  - Tissue Placement
- Pen markings
- ROI detection, focal points, air bubbles, and good old dust!

# Network Requirements

- No real problems seen in our experience
  - Trickle versus firehose
  - Storage capacity on NAS is a problem but that's another slide
  - Data center to home performs adequately
  - Data center to desk, conference room is brisk
- Writing to NAS seems to work well
- International bandwidth handling is an interesting issue
  - Do different vendors have unique niche's in this arena?
- Are intensive processes such as image analysis limited by bandwidth?
  - When you have to move back to local its painful!

# Image Processing

- Thumb nailing
- ROI Detection
- Focal point placement
- Error processing
- Image release
- Image retention
- Image purge



# Image Release Software

- Do you have release software?
  - Post scan annotation software
    - If not, do you do annotation prescan?
      - Programmed run?
  - Pre post? Does it matter? It takes time...
- Interfacing eliminates this step
  - 1 minute per slide
  - No errors

# Storage

- Clearly use at least Network Attached Storage (NAS)
- Cloud coming to you?
- Retention management
  - Retentions control
  - Backup
  - Retrieval
    - Warm, cold, freezing?
- Cost per petabyte?
  - Scalability
  - NAS vs. Cloud
- Backup? The clouds advantage?
- Cloud storage supports distribution needs

# Viewing Software

- Authentication
- Case organization
- Pathologist assignment
  - Referral
- Data available
  - LIS
  - EMR
  - Web resources
- Annotation
- Routing
- Retention
- Collaboration
- LIS Report Integration
- Pathologist cockpit

# Analysis Software

- FDA or not
- 3<sup>rd</sup> party software
- Research support
  - Export of WSI into flat file
- Mostly off label, not integrated
  - This is a huge barrier for future utilization
    - No engineering standards