

# Phantom Development Approach Proposal for Measurement Method

**Pathology Visions 2015**  
Philips Research  
2015 Oct 12

# Draft Guidance Document

## Technical Performance Assessment of Digital Pathology

### Whole Slide Imaging Devices

February 25, 2015

#### IV(B). System-level Assessment

IV(B)(1). Color Reproducibility

IV(B)(2). Spatial Resolution

IV(B)(3). Focusing Test

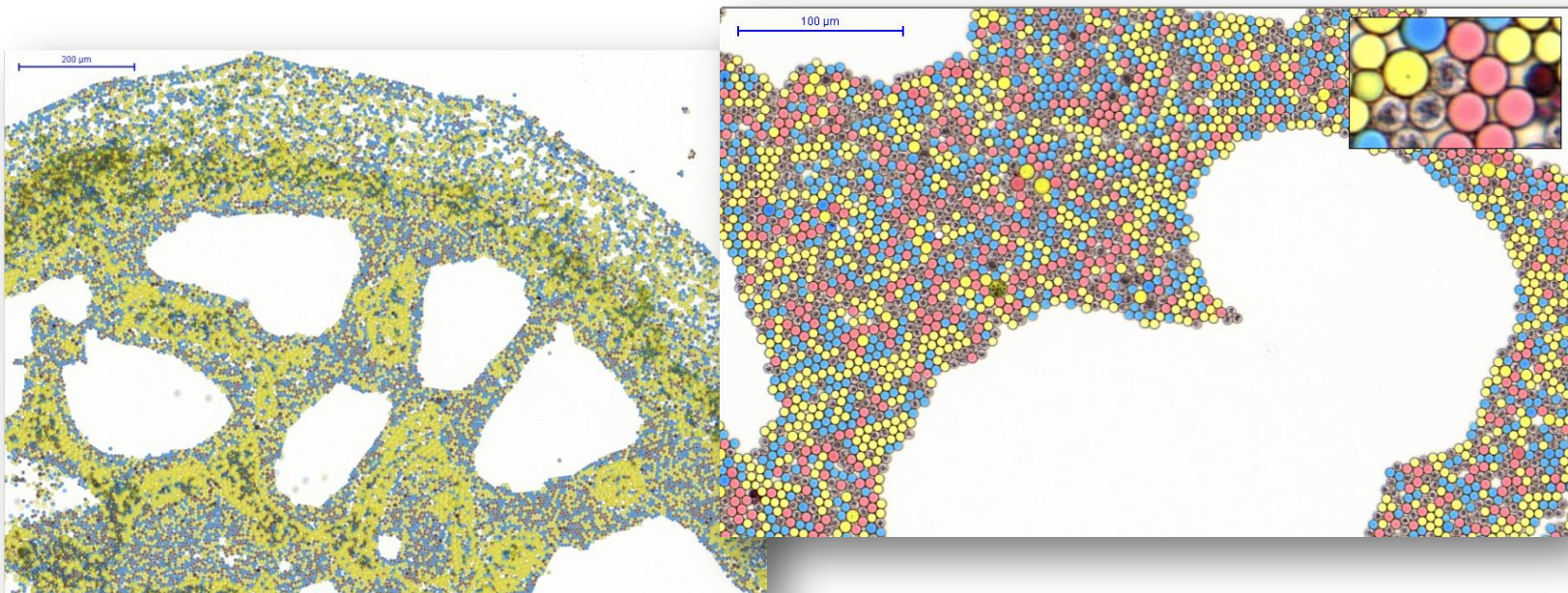
IV(B)(4). Whole Slide Tissue Coverage

IV(B)(5). Stitching Error

# Micro beads to create phantom models for system level

Micro beads give interesting possibilities for phantom development:

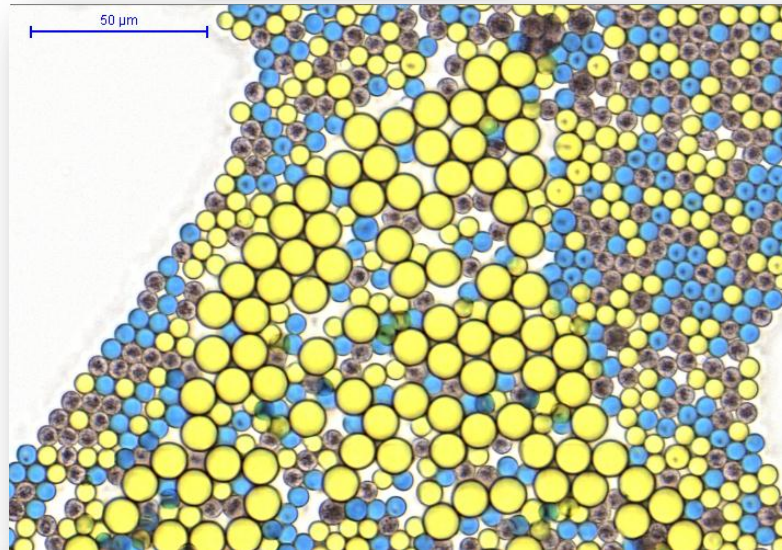
- Commercially available
- Well defined spherical objects with small tolerance
- Variety of colors and sizes (diameter range from 0.2 to 20  $\mu\text{m}$ )
- Refractive index and absorption properties close to tissue
- Possible to be spotted and printed in monolayers
- Suited for manufacturing of large batches of samples/phantoms





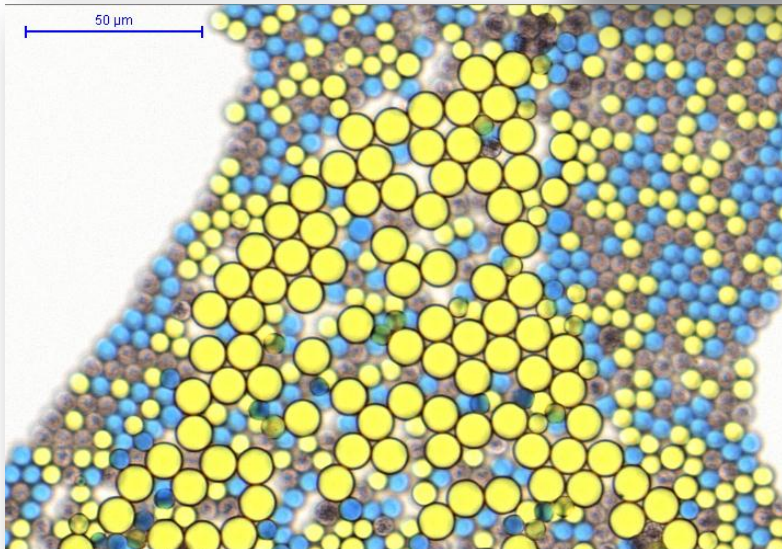
# TPA Focusing Test: Micro beads of different sizes and colors

Focus optimal

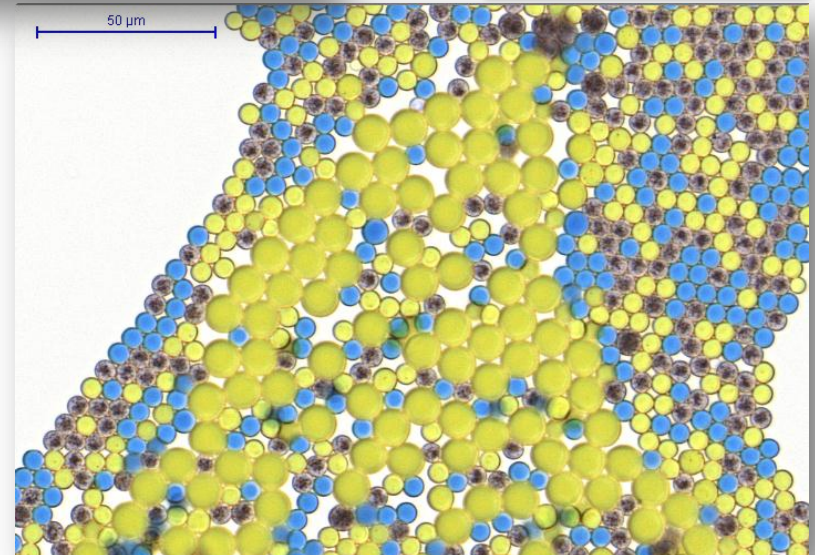


Large beads: 10 μm  
Small beads: 6 μm

Focus too high

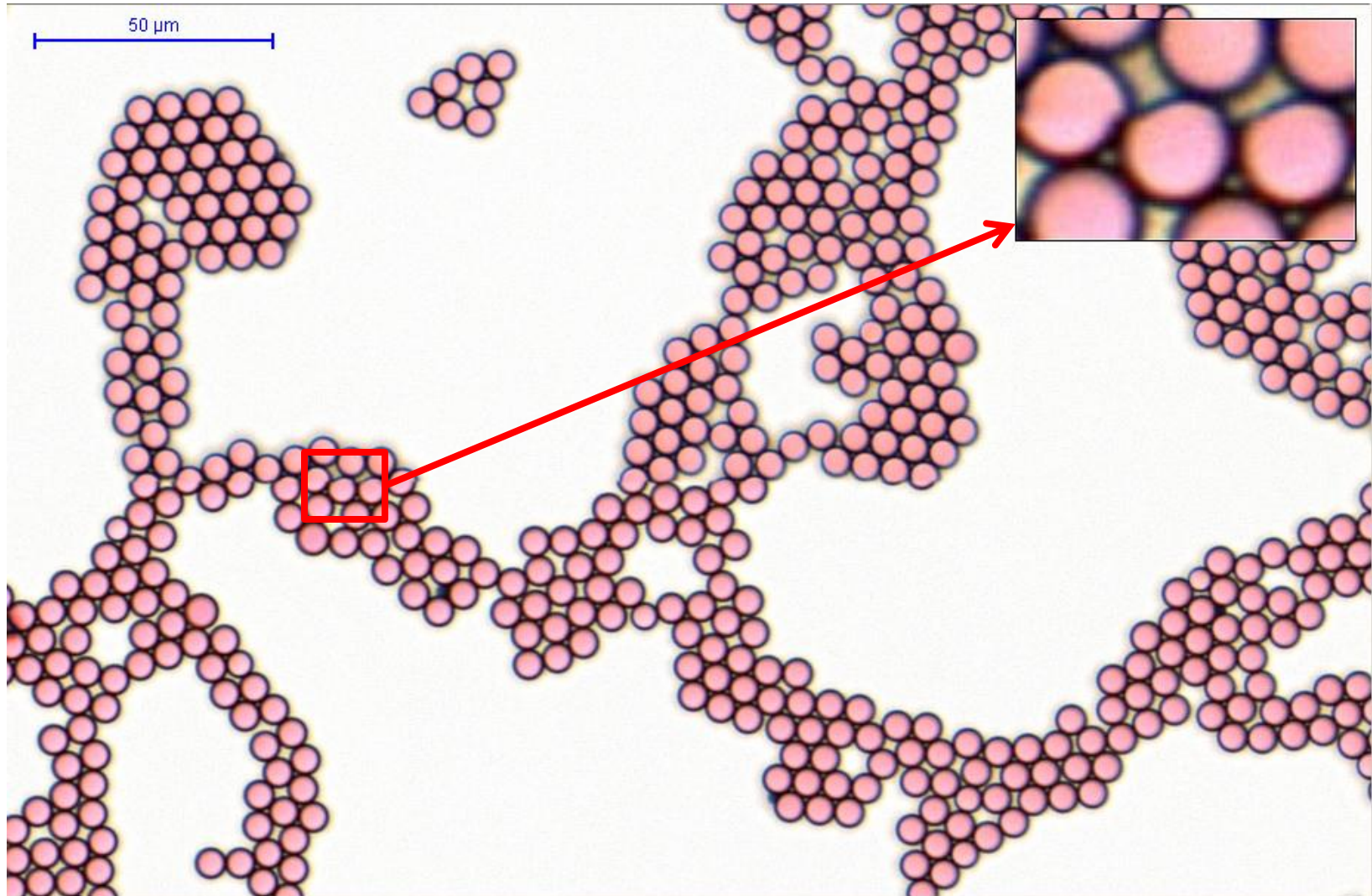


Focus too low



# TPA Stitching error test: Beads structure defects

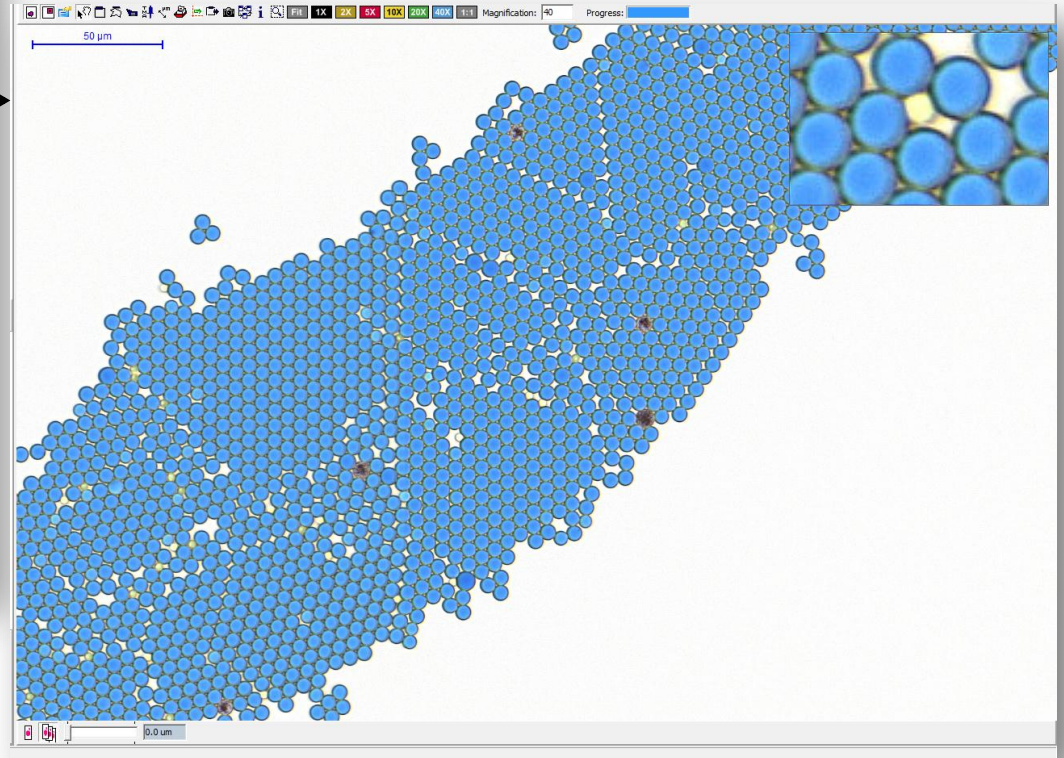
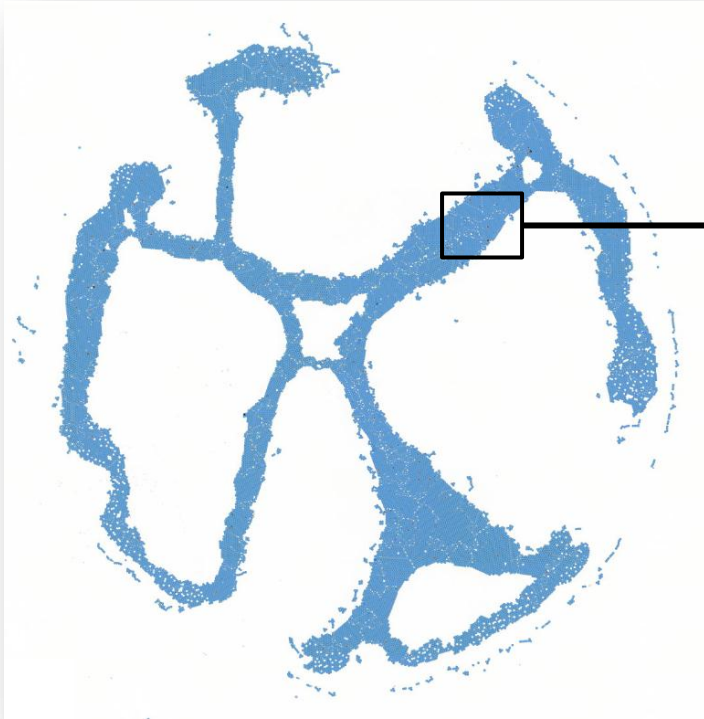
Automated algorithm to locate defects due to stitching





# TPA Whole slide tissue coverage test: Mixture and structure

Beads mixture: blue 6  $\mu\text{m}$  + 0.1% yellow 3  $\mu\text{m}$  + 0.1% violet 6  $\mu\text{m}$



Measurement method: Accuracy of mixture detection per section and total

# Conclusions

- Micro beads are regarded as very interesting directions for Digital Pathology phantoms
- Several TPA System level tests measurement methods can be developed based on micro beads:

## IV(B). System-level Assessment

IV(B)(1). Color Reproducibility

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- Combination of multiple system level tests in one phantom might be possible
- Measurement algorithms for these tests are investigated further

