



**Calibration Slide for Histopathology task force
Teleconference**

9 December 2013 • 15:00 (UK) / 10:00 (EST)

The meeting was called to order at 10:00 am (EST) by Craig Revie, acting chair, with the following attendees:

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|-----------------|------------------------------|
| Pinky Bautista | MGH PICT Center |
| Vipul Baxi | Omnyx |
| Wei-Chung Cheng | Food and Drug Administration |
| Scott Forster | Roche Ventana |
| Phil Green | Gjøvik University College |
| Bas Hulsken | Philips Healthcare Incubator |
| Tom Lianza | X-Rite |
| Allen Olson | Leica Biosystems |
| Debbie Orf | NPES |
| Viktor Varga | 3DHISTECH Kft. |
| Dave Wyble | Avian Rochester, LLC |

After a check of the sound quality Mr. Revie reviewed the agenda for the meeting as follows:

1. Candidates for reference slide
2. Measurement methods – slide and display
3. Single calibration for all stains or one for each stain
4. Viewing conditions – fixed, completely variable or provide general guidelines
5. Image format (DICOM?)

Mr. Revie provided a presentation (see attached) that reviewed some topics from the Vancouver meeting.

He emphasised that assessment of accuracy/conformance is a separate procedure from the calibration. The assessment could be standardised, but the calibration process should be vendor-specific. The implication is that one or more agreed test targets should be adopted for assessment, and manufacturers could choose to use this for calibration or to use a different one.

The meeting briefly discussed the issue of what point to capture the display RGB values when calibrating the monitor. There might be some merit to having a separate step where the frame store values sent to the display are recorded, possibly using a FPGA as described by Wei-Chung Cheng; for example, this would allow multiple displays to be supported. It was acknowledged that many displays perform on-board colour

management using matrix and single-channel curves, but it was not practical to evaluate monitor processing as a separate part of the assessment.

Image format

DICOM using mRGB was considered a suitable format for carrying image data and profile. However, DICOM and mRGB may not add anything, since the profile defines the transform to the Profile Connection Space which would make other formats also feasible.

Mr. Hulsken noted that for FDA approval of a scanner it would be necessary to show the accuracy of an image when the profile was applied to convert to PCS colorimetry. The transform from the PCS to the display is the responsibility of the monitor manufacturer.

The meeting noted the need to support pseudo-colour as well as colorimetric accuracy.

For spectral data, it was noted that the current ICC profile format allows both colorimetric and spectral data to be included in the profile as metadata, and that the v5 format (likely to be published by the end of 2014) would allow a spectral PCS and spectral processing, as discussed at the Vancouver meeting. Those with an interest in this topic were invited to discuss with Max Derhak. [Max.Derhak@onygfx.com]

Mr Lianza proposed that the goal for the calibration slide is that a small quantity of highly consistent slides are produced and certified by a national standards laboratory such as NIST, and that larger quantities of less repeatable targets can then be produced at lower cost. Manufacturers should acquire a single primary target and use this to calibrate their secondary standards with their own metrology. Mr Lianza agreed to present a proposal at the January meeting, including how the target would be made and what the design would be. Mr Varga noted that many vendors are already using IT8.7/1 film-based targets (ISO 12641). Mr Revie invited all vendors make proposals in the January meeting so this topic can be progressed.

Mr Revie thanked those attending and undertook to add ideas from the meeting to the draft document and circulate for comment.

The next meeting will be scheduled for the week of January 20 at 15:00 GMT (10:00 EST).

Actions:

1. Present proposal for slide design and production at next meeting - Tom Lianza
2. Contribute proposals on slide design and production at next meeting – all vendors with an interest
3. Update 'Digital_microscope_test_materials_and_test_methods' document in light of discussion and circulate in advance of next meeting – Craig Revie
4. Distribute a doodle poll to determine the best date for the next teleconference – Debbie Orf

Calibration slide for histopathology

**Teleconference
December 9th 2013**

ICC MIWG Participants

| Company / Organisation | Primary contact name | Primary contact email | Status | ICCWG |
|-------------------------------|----------------------|---------------------------------|-----------------------------|-------|
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| Roche Ventana | Scott Forster | scott.forster@ventana.roche.com | Vendor representative | Y |
| Leica / Aperio | Allen Olson | allen.olson@leicabiosystems.com | Vendor representative | |
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| FDA | Aldo Badano | Aldo.Badano@fda.hhs.gov | Organisation representative | Y |
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| GE Omnyx | Michael Meissner | Michael.Meissner@omnyx.com | DICOM WG26 Chair | |
| MGH / Harvard | Yukako Yagi | YYAGI@PARTNERS.ORG | Research participant | |
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| Avian Rochester | Dave Wyble | dave@avianrochester.com | Vendor representative | Y |

Reminder to join the MIWG mailing list:
 subscribe at <http://lists.color.org/mailman/listinfo/medical>
 The list email address is medical@lists.color.org.

Agenda

- **Vancouver meeting**
- **Reference slide**
- **Viewing conditions**
- **Single calibration for all stains or one for each stain**
- **Image format (DICOM?)**
- **Next meeting week of 20th January 2014**

Vancouver meeting

- **Calibration methods**
 - 9-patch target (Yukako Yagi)
 - Film based slide (Vipul Baxi, Viktor Varga, Bas Hulsken)
 - Linear variable filter (Allen Olson)
- **Discussion of FPGA**
 - difficulties in accessing RGB data from DVI (actual data sent to the display may be 'hashed')
 - make this interface more general
- **Display calibration**
 - any comments on the mRGB proposal?
 - is this a reasonable / necessary requirement for digital microscope systems?
 - supporting an sRGB model as well as mRGB may provide both a low cost and high quality possibility
- **Single calibration for all stains or one for each stain**
 - calibration assessment should consider staining protocols

Reference slide

- **Is our aim as a group to identify and test a suitable reference?**
 - would it be best to identify a single reference slide for all to use?
- **Who will manufacture calibration reference materials?**
 - how this will be paid for?
 - we are discussing the idea of calibration assessment in our group and this lacks concrete details as to what a calibration reference slide will look like
- **I would like to understand better in our January meeting the process to identify and test suitable candidates**

Viewing conditions

- **Slide viewing**
 - spectral transmittance measurements
 - light source (CIE Illuminant E ?)
 - environment (no ambient illumination?)
- **ICC PCS**
 - only an issue for Perceptual Rendering Intent
 - is relative colorimetric assessment adequate?
- **Display viewing**
 - sRGB with standard ambient
 - sRGB with modified (realistic) ambient
 - mRGB – GSDF compensates for ambient level
 - requirements for viewing environments

Image format (DICOM?)

- **For the purposes of modular testing it would be convenient to have a single file format that all systems were capable of supporting**
 - is this a realistic goal?
 - is DICOM a candidate?