



**ICC Medical Imaging Working Group
Webinar
August 1, 2013**

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

Aldo Badano	FDA
Vipul Baxi	
James Chang	Sharp Labs of America
David Clunie	PixelMed
John Dalrymple	Consultant
Glenn Davis	Ventana Medical Systems
Lou Dietz	Ventana Medical Systems
Scott Forster	Ventana Roche
MariBeth Gagnon	Centers for Disease Control and Prevention
Phil Green	Gjøvik University College
Stephen Hewitt	NCI, NIH
Po-Chieh Hung	Konica Minolta
Tom Kimpe	Barco NV
Florian Knicker	Panasonic
Elizabeth Krupinski	Univ AZ
Veronika Lovell	Sun Chemical
Michael Meissner	Omnyx
Allen Olson	Leica Biosystems
Debbie Orf	NPES
John Penczek	NIST
Craig Revie	FFEI Limited
Thomas Schopf	NST
Christye Sisson	Rochester Institute of Technology
Chukka Srinivas	Ventana
Darren Treanor	University of Leeds
Masahiro Yamaguchi	Tokyo Institute of Technology
Ofra Zinaty	Given Imaging Ltd.

Following self-introductions, Mr. Revie proceeded to review the agenda for the meeting as follows:

1. Consensus paper (Aldo Badano)
2. ICC Medical Imaging Working Group (Craig Revie / Phil Green)
3. Status and next steps for candidate work items (project coordinators)
4. Next meeting

The agenda was approved as submitted.

1. Consensus paper (Aldo Badano)

a. Current status and next steps

Mr. Badano reported that we have a complete set of submissions from all those who were asked to report at the summit so all sections are represented. The report, including figures and tables, is currently at 13 pages (small typeface, single spaced) and in this form it is too long for a paper in a journal. He suggested creating an executive summary of the report with the full version made available on the ICC website and/or another venue. The final decision must wait for a determination regarding which journal to publish the report. Mr. Badano has initiated contact with two journals and he noted that a list of journals have been submitted by those at the summit. He recommended *Academic Radiology* as a good choice as radiology was well represented and has indicated an interest.

He recommended that the first draft be sent to the contributors for review and then circulate to the wider group for initial feedback to determine if the report represents the general ideas discussed at the summit and to reach a consensus on what the next steps should be. It is anticipated that the paper will be ready for submission by the end of the year.

Action 13-01: Aldo Badano and Craig Revie to develop a full write-up of the first draft of the paper including all sections by end of August.

b. Publication options

There was a question on whether picking a radiology journal was the best choice as the majority of participants at the summit were not radiologists or in the field. The *Journal of Digital Imaging* may be a good alternate choice as it does have radiology community but is more general. It was noted that this publication has an open access policy; after paying an open access fee we can be assured that the article is available. This should also be mirrored on an appropriate website such as the ICC. One concern was that the readership of JDI may not be made up of those in the clinical world that we are trying to reach. Our users are a disparate group so finding the appropriate journal will be a challenge.

It was noted that in clinical practice there are often consensus papers that are published in multiple journals in the same format. For example, a gastrointestinal pathology paper would be published in both a gastrointestinal journal as well as a pathology journal. It was suggested that we should choose several domains and find a suitable clinical journal in each area.

It was agreed that we need to find a publication to reach clinicians, however it was noted the *American Journal of Pathology* would not be interested in publishing this paper. Some felt it would be better to

keep out of both radiology and pathology journals and try find neutral ground. The question was asked if we should approach the *Journal of the American Medical Association (JAMA)* and explain that this is the future of medicine and that it is an issue that crosses boundaries. An alternative in the US would be to go to the *Archives of Pathology & Laboratory of Medicine* and see if they would co-publish.

Another suggestion was to publish the report in a telemedicine journal. Elizabeth Krupinski stated that as the co-editor of the *Journal of Telemedicine and Telecare* as well as being on the editorial board of *Telemedicine and e-Health* that she would be willing to serve as liaison for either publication.

Mr. Revie asked that those with further suggestions on publication options get in touch with Aldo Badano.

2. ICC Medical Imaging Working Group (Craig Revie / Phil Green)

a. Current status / joining the working group activities

Phil Green provided a presentation discussing the requirements for membership and meeting operation. His entire presentation is provided in attachment A.

He reported that the ICC Steering Committee has approved the charter and set up the Medical Imaging Working Group (MIWG) with Craig Revie as interim chair. At the first official meeting of the working group the chair and co-chair will be elected by the group.

Currently the 3 membership categories include the following:

1. Honorary
2. Individual
3. Regular

Mr. Badano asked if there is a mechanism for government agencies to become members. Mr. Revie stated that a government agency may qualify as an honorary member. If it is determined that there is no membership option for a government agency then a liaison may be appropriate. This will be discussed further offline. Those participants who are part of an organization that does not wish to become a member of the ICC can join as individuals.

Action 13-02: Orf to distribute membership information to the participants on the call. Also a distribution with information about the working group along with membership information will go out to all participants of the Medical Imaging Summit.

b. How will we operate, face-to-face / teleconference / subgroups / liaison

The operation of the MIWG would include activities that are based around agreed-upon work items. This group would also include liaisons that are bi-directional and would provide a report during the Business Meeting that takes place at the beginning of regular ICC meetings. It is expected that liaisons from ICC should be ICC members whereas liaisons to the ICC don't have to be members.

The next ICC meeting is scheduled to be held 18-20 November 2013 in Vancouver and could be the first face-to-face meeting of this group. Teleconferences can be scheduled using the NPES teleconference facility for the entire working group as well as for sub-groups as necessary.

Mr. Revie stated that the task force meetings will continue to run in parallel with the working group. Those who are not able to join the ICC will be able to participate in the task force for a specific time period.

c. ICC medical imaging working group email list and web site

Mr. Green stated that the MIWG is now listed on the ICC web groups page and that a webpage for the group itself has been created along with the mailing list. The webpage can be accessed at: http://www.color.org/groups/medical_imaging_wg.xalter

Mr. Green stated that all ICC working group minutes are currently posted in the member-only area of the website. However, since DICOM has a requirement, for anti-trust reasons, to make all minutes public the ICC will address this with a resolution at the next steering committee meeting. Mr. Revie stated that he has a task to investigate this issue, in particular the differences between how this group will operate and how DICOM works. Mr. Revie and Mr. Clunie agreed to continue the discussion offline.

3. Candidate work items (project coordinators)

a. Multispectral Imaging

Masahiro Yamaguchi provided a presentation on the work being done in the area of multispectral imaging which is included as attachment B.

It was noted that there has been some preliminary discussion in DICOM working group 26 on multispectral imaging and it would be good to sync up with the corresponding group. Accordingly, it was suggested that Ken Watson be included in future discussions of this task force.

Mr. Yamaguchi asked that anyone on the call with an interest in participating on this task force contact him.

b. DICOM camera raw support and EXIF tags

David Clunie reported that there has been no activity on EXIF tags.

c. Open source reference implementation

Mr. Clunie reported that he has started preliminary research on open source code as well as making contact with the OsiriX community which provides open source viewers on Mac as well as ClearCanvas who have open source viewers on the PC/windows side. Mr. Clunie states that in his own research he has found some limitation in the java color management support for version 4 profiles. He expects this will be rectified in newer releases of Java 8 which uses Little CMS in place of the (now outdated) Kodak CMS colour engine. He feels that it will be difficult to get primary developers of C++ or objective C interested in this area because they have other higher priority tasks to deal with. To date he has received no feedback (positive or negative) with respect to level of interest.

Mr. Clunie stated that he has not solicited other volunteers as yet and asked that anyone on the call with an interest contact him.

Mr. Revie stated that Marti Maria, who originally developed Little CMS, is an active ICC member and suggested that Mr. Clunie contact him to discuss how lcms might be deployed more effectively.

d. Medical RGB Colorspace

No report

e. Colour support for mobile device

No report

f. Best practice papers for colour in DICOM

No report

g. Calibration slide for histopathology

Mr. Revie presented a list of participants, as shown in attachment C, for this activity with an indication of how each member will participate. He stated that the next step is to have a teleconference and provided a proposed agenda for the meeting.

Mr. Hewitt reported there is a generation one that will be ready shortly. He stated they have approximately 8-10 stains for the calibration objective that can be presented on a single slide for testing.

There was a suggestion to conduct a separate set of teleconference calls for those who are interested.

h. New items

Mr. Penzcek suggested there be a work item added for a best practices guide for digital photography. It was agreed to add this and Mr. Penzcek volunteered to act as lead to start the discussion and to identify people to participate in the discussion.

Ms. Sisson volunteered to coordinate a topic to work on a calibration standard for ophthalmology. She will facilitate and recruit members for this discussion.

These two items have been added to the list of candidate work items. The problem statement and proposal for both are shown in attachment D.

4. Next meeting

The suggested dates for the next call are the week of 23rd September or the week of 7th October.

Action: Orf to create a doodle poll to determine the best dates for the next teleconference.

There being no further business, the meeting adjourned at 11:02 a.m.

Respectfully submitted,



Debra K. Orf
ICC Secretary

ICC Medical Imaging Working group

Phil Green
ICC Technical Secretary

Current status

- **Working Group and Charter approved by ICC Steering Committee on June 10**
- **Craig Revie is first Chair – subject to election by Working Group**
- **Working Group listed on ICC Working Groups page**
- **Medical Imaging Working Group web page set up in public area of ICC web site**
- **Working Group mailing list set up**

MIWG: Operation

Membership

- **WG members can**
 - Represent ICC Member companies
 - Represent an Honorary Member (university)
 - Join as Individual member

MIWG: Operation

Meetings

- **Physical meetings**
 - Normally co-located with regular ICC meetings
 - Next ICC meeting is November 18-20 in Vancouver
- **Teleconferences**
 - Using NPES webconference or teleconference facility
- **Frequency**
 - Can meet as often as necessary; suggested:
 - One physical meeting of whole WG
 - One or more telecon of whole WG
 - Sub-group telecons as needed

MIWG: Operation

Activities

- **Main activities around agreed work items**
 - New Action Items normally assigned at Working Group meetings, progress reported at next meeting

Liaison

- **Can be:**
 - ICC liaisons (bi-directional, report to ICC Business Meeting)
 - Informal (report to working group)
- **Liaisons from ICC should be members (?)**

MIWG: Publication of documents

Minutes

- ICC Working Group minutes are posted in the restricted member-only area of the web site.
- Requires a resolution of the Steering Committee to vary this for MIWG

All other documents

- Working group decides on whether to make public

Mailing List

- **List is hosted by a third party using Mailman**
- **Working Group members can subscribe at**
 - <http://lists.color.org/mailman/listinfo/medical>
- **To post to the list:**
 - medical@lists.color.org
- **General**
 - Change password to something meaningful
 - In case of problems: <http://www.color.org/memberaccess.xalter>
 - Contact Debbie Orf if you lose your login details – or just go to the listinfo page and re-subscribe
 - Avoid sending out-of-office replies to the list – the listserv will unsubscribe you

Web page

- **The MIWG web page is at:**
 - http://www.color.org/groups/medical_imaging_wg.xalter
- **Content as of now is:**
 - Charter
 - Meetings
 - Activities
 - Participation
- **All relevant material can be posted on the web page**
- **Additional pages can be added (e.g. pages for individual work items)**

Transition from task force to Working Group

To allow time for interested task force members to complete membership procedures

- **ICC has a policy of inviting guests to participate in WGs and their meetings**
- **Participation limited to 1-2 meetings**
- **This would allow task force members to attend meetings and continue to participate in WG activities without interruption**
- **Proposed disbandment of task force: May 2014**

Joining MIWG

- **Honorary**
 - Attend meetings as guest from University
 - Apply as University to be Honorary Member
 - Sign ICC IP agreement
- **Individual**
 - Sign ICC Working Group Membership Agreement
 - Sign ICC IP agreement
 - Send application to Debbie Orf + fee \$250 p.a.
- **Regular**
 - Sign Membership Agreement, Promoters Agreement and IP agreement
 - Send application to Debbie + fee \$2500 p.a.



Framework for multispectral imaging

- Define a multispectral imaging framework
- Participants
 - Organisations: DICOM WG26, CIE TC8-07, ICC
 - Individuals: <teleconference><other>
 - Project coordinator: Masahiro Yamaguchi

Multispectral imaging is valuable not only for color reproduction, but also for the image analyses for pattern recognition, quantification, and pseudocolor representation.

Current status

- “Multispectral” Teleconference
 - Date&Time: June 7, 2013, 2:00pm CEST, 8:00am EDT, 9:00pm JST
 - Agenda:
 - Multispectral presentation state for Digital Pathology
 - Participants: Bas Hulsken, Max Derhak, Masahiro Yamaguchi

Discussion

In digital pathology application, multispectral imaging enables to estimate the images of concentration or amount of multiple fluorescent- or staining- dyes (biomarker); i.e., spectral unmixing.

1: Display multispectral images as true color visible light images.

2: Quantitative representations of dye amount image.

3: Display un-mixed multispectral images as pseudo color images.

Next steps

Toward the framework for multispectral imaging

- Analysis of the workflow of a few possible applications:
 - Examples such as,
 - Whole Slide Image scanner for digital pathology (ex. spectral unmixing)
 - Color enhancement, narrow band images, hi-fi color, quantification
 - Requirements to multispectral systems for specific applications
 - Necessary information as metadata.
- Collecting good examples of current works in this area
 - Best practice for multispectral applications
- Proposal on the extension of current DICOM WSI specification.
- Related activities
 - ReflccLabs, CIE TC8-07 “Multispectral imaging”

Invitation to multispectral imaging

WG members interested in this field are very welcome to join the discussion and to contribute to this work item.

- Contact:

Masahiro Yamaguchi

Tokyo Institute of Technology

E-mail: yamaguchi.m.aa@m.titech.ac.jp

Calibration slide for histopathology

Participants

Company / Organisation	Primary contact name	Primary contact email	Status
FFEI Limited, ICC	Craig Revie	craig.revie@ffe.co.uk	ICC project coordinator
GE Omnyx	Michael Montalto	Michael.Montalto@omnyx.com	Vendor representative
Philips	Bas Hulsken	bas.hulsken@philips.com	Vendor representative
Roche Ventana	Scott Forster	scott.forster@ventana.roche.com	Vendor representative
Leica / Aperio	Allen Olson	allen.olson@leicabiosystems.com	Vendor representative
GE Omnyx	Vipul Baxi	Vipul.Baxi@omnyx.com	Vendor representative
NIH, NCI	Stephen Hewitt	hewitts@mail.nih.gov	Organisation representative
FDA	Aldo Badano	Aldo.Badano@fda.hhs.gov	Organisation representative
GE Omnyx	Michael Meissner	Michael.Meissner@omnyx.com	DICOM WG26 Chair
MGH / Harvard	Yukako Yagi	YYAGI@PARTNERS.ORG	Research participant
Leeds Hospital	Darren Treanor	darrentreanor@nhs.net	Research participant

Calibration slide for histopathology

Problem statement

One reason for differences in whole slide imaging is the lack of a suitable calibration process which means that the same slide can look very different from system to system.

Proposal

Vendors that have worked in this area should pool their resources to develop a calibration system for digital microscopes.

Next steps (teleconference)

- **Definition of calibration objectives and requirements**
- **Definition of the project scope**
- **Approximate timescale and milestones**
- **Rules for participation**

Best practices for digital photography in medicine

- **Problem statement**

- There are many cases where colour plays an important role in the diagnosis of disease from a medical image but it is not easy for a medical photographer to know how best to capture and communicate images

- **Proposal**

- Develop best practice guidelines for medical photography including jpeg and raw use cases

- **Participants**

- Organisations:
 - Individuals: <teleconference><other>
 - Project coordinator: John Penczek

Calibration standard for ophthalmology

- **Problem statement**
 - One reason for the color differences in the appearance of the retina in fundus imaging in ophthalmology is the lack of a suitable calibration method or standard. This causes significant retinal color disparity from camera to camera, even within the same manufacturer for the same patient.
- **Proposal**
 - Develop a suitable calibration phantom and calibration method, and devise the best working/vendor practices to ensure color consistency across devices and manufacturers.
- **Participants**
 - Organisations:
 - Individuals: <teleconference><other>
 - Project coordinator: Christye Sisson